TM 11-5815-206-12

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATION AND ORGANIZATIONAL MAINTENANCE

TELETYPEWRITER SET AN/PGC-1 AND TELETYPEWRITERS TT-4A/TG AND TT-4B/TG

HEADQUARTERS, DEPARTMENT OF THE ARMY
APRIL 1959

WARNING

DANGEROUS VOLTAGES EXIST IN THIS EQUIPMENT

Be careful when working on the 105- to 125-volt motor and signal circuits. Serious injury or death may result from contact with these circuits. Turn off the power and discharge all high-voltage capacitors before making any connections or replacing any parts inside the equipment.

DON'T TAKE CHANCES!

*TM 11-5815-206-12

TECHNICAL MANUAL
No. 11-5815-206-12

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON 25, D.C., *8 April 1959*

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		Paragraph	Page
CHAPTER 1.	INTRODUCTION		
Section I.	General.		
	Scope	1	3
	Forms and records	2	3
II.	Description and data.		
	Purpose and use	3	3
	Technical characteristics	4	5
	Components	5	6
	Common names	6	6
	Description	7	6
	Differences in models	8	6
CHAPTER 2.	INSTALLATION		
Section I.	Service upon receipt of equipment.		
	Unpacking	9	13
	Checking unpacked equipment	10	13
	Siting	11	13
II.	Preliminary installation procedure.		
	General	12	15
	Checking fuses	13	15
	Unlocking locking devices	14	15
	Motor power and protective ground connections	15	16
	Adjusting motor speed	16	16
III.	Final installation procedure.		
	Installation options	17	17
	Signal line and dc power connections, general	18	17
	Connections for half-duplex operation (dc system)	19	18
	Connections for half-duplex operation (voice-frequency system)	20	19
	Connections for receive-only operation	21	19
	Connections for full-duplex operation	22	19
	Connections for ground-return signal circuit	23	20
	Line current adjustment	24	20
	ARMATURE and RANGE dials adjustment	25	20
	Installation final test	26	21
CHAPTER 3.	OPERATION		
Section I.	Controls and indicators.		
	Controls	27	22
	Indicators	28	23
II.	Operation under usual conditions.		
	Modes of operation	29	24
	Preliminary starting procedure	30	24
	Installing recording paper	31	24
	Installing or changing inking ribbon	32	25
	Starting procedure	33	27
	Operating procedure	34	27
	Stopping procedure	35	28
CHAPTER 4.	OPERATOR'S MAINTENANCE INSTRUCTIONS		
	Scope of operator's maintenance	36	29
	Preventive maintenance	37	29
	Visual inspection	38	29
	Equipment performance check list	39	32
	Replacement of lamp and fuses	40	34

***This manual supersedes so much of TM 11-2234, 6 April 1951, including C 1, 19 October 1953; C 2, 23 November 1955; and C 3, October 1957, as is applicable to the installation, operation, and organizational maintenance of the equipment.**

		Paragraph	Page
CHAPTER 5.	AUXILIARY EQUIPMENT		
	General	41	35
	Purpose of telegraph terminal TH–5/TG	42	35
	Use of TH–5/TG with AN/PGC–1	43	35
CHAPTER 6.	SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE		
Section I.	Shipment and limited storage.		
	Disassembly of equipment	44	36
	Repackaging for shipment or limited storage	45	36
II.	Demolition of materiel to prevent enemy use.		
	Authority for demolition	46	36
	Methods of destruction	47	36
APPENDIX I.	REFERENCES		37
II.	MAINTENANCE ALLOCATION CHART		38

Figure 1. Teletypewriter Set AN/PGC–1, in use.

CHAPTER 1
INTRODUCTION

Section I. GENERAL

1. Scope

a. This manual describes Teletypewriter Set AN/PGC–1, Teletypewriter TT–4A/TG, and Teletypewriter TT–4B/TG and covers their installation, operation, and organizational maintenance.

b. Official nomenclature followed by (*) is used to indicate all models of the equipment item covered in this manual. Thus, Teletypewriter TT–4(*)/TG represents Teletypewriters TT–4A/TG and TT–4B/TG, and Case CY–694(*)/PGC–1 represents Cases CY–694/PGC–1 and CY–694A/PGC–1.

2. Forms and Records

a. Unsatisfactory Equipment Reports.

(1) Fill out and forward DA Form 468 (Unsatisfactory Equipment Report) to the Commanding Officer, U.S. Army Signal Equipment Support Agency, Fort Monmouth, N.J., as prescribed in AR 700–38.

(2) Fill out and forward AFTO Form 29 (Unsatisfactory Report) to the Commander, Air Materiel Command, Wright-Patterson Air Force Base, Ohio, as prescribed in AF TO 00–35D–54.

b. Report of Damaged or Improper Shipment. Fill out and forward DD Form 6 (Report of Damaged or Improper Shipment) as prescribed in AR 700–58 (Army), Navy Shipping Guide, Article 1850–4 (Navy), and AFR 71–4 (Air Force).

c. Preventive Maintenance Form. Prepare DA Form 11–252 (figs. 22 and 23). Maintenance Check List for Signal Equipment (Teletypewriter) in accordance with instructions on the form.

d. Parts List Form. Forward DA Form 2028 (Recommended Changes to DA Technical Manual Parts Lists or Supply Manuals 7, 8, and 9) direct to the Commanding Officer, U.S. Army Signal Equipment Support Agency, ATTN: SIG FM/ES–ML, Fort Monmouth, N.J., with comments on parts listings.

e. Comments on Manual. Forward all comments on this publication direct to the Commanding Officer, U.S. Army Signal Publications Agency, Fort Monmouth, N.J.

Section II. DESCRIPTION AND DATA

3. Purpose and Use

a. Purpose. Teletypewriter Set AN/PGC–1 and Teletypewriters TT–4A/TG and TT–4B/TG are used to transmit teletypewriter messages in the form of direct-current (dc) teletypewriter signals and to convert received dc signals into messages printed on a roll of recording paper.

b. Use (fig. 2). The AN/PGC–1 and TT–4(*)/TG are used in tactical military communication systems. Typical applications are—

(1) *dc system.* In a typical dc system, the sending teletypewriter transmits dc signals to the receiving teletypewriter over a dc circuit that interconnects the two teletypewriters.

(2) *Voice-frequency system.* In a typical voice-frequency system, the sending teletypewriter transmits dc signals to a telegraph terminal which converts the dc signals to voice-frequency signals. The voice-frequency signals are transmitted to a distant telegraph terminal either through telephone switching equipment or over a direct circuit interconnecting the two telegraph terminals. The distant telegraph terminal converts the voice-frequency signals to dc signals and transmits the dc signals to the receiving teletypewriter.

(3) *Carrier system.* In a typical carrier

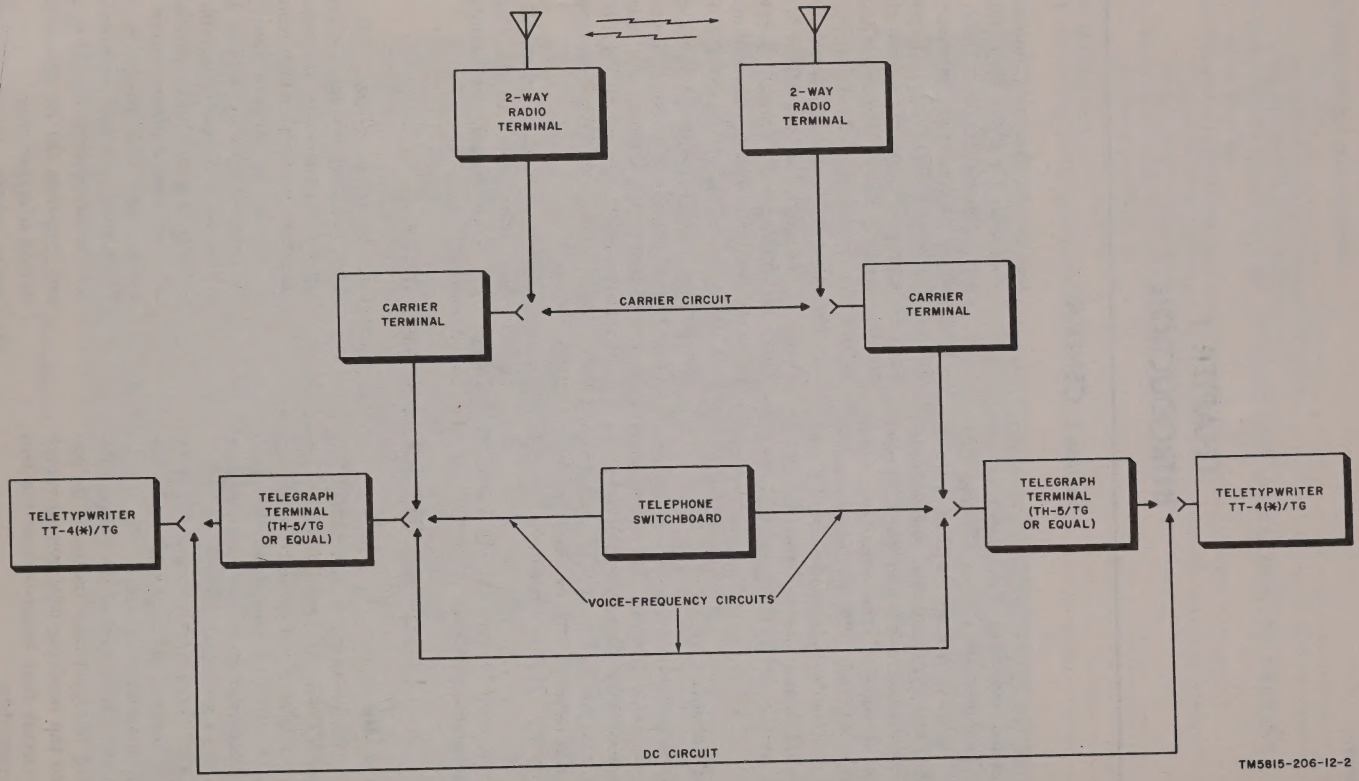


Figure 2. Typical system-application options.

system, the sending teletypewriter transmits dc signals to a telegraph terminal which converts the dc signals to voice-frequency signals and transmits them to a carrier terminal. The carrier terminal converts the voice-frequency signals to carrier signals and transmits the carrier signals to a distant carrier terminal. The distant carrier terminal converts the received carrier signals to voice-frequency signals and transmits them to a telegraph terminal where the voice-frequency signals are converted to dc signals and transmitted to the receiving teletypewriter.

(4) *Radio-teletypewriter system.* In a typical radio-teletypewriter system, signal transmission is the same as in a carrier system ((3) above) except that transmission between carrier terminals is accomplished over a two-way radio circuit instead of a carrier circuit.

c. Circuit Speeds. The teletypewriters are factory-adjusted to operate in 60-words-per-minute (wpm) (368.1 operations-per-minute (opm)) teletypewriter circuits. Accessory gears are included with the TT–4(*)/TG for operation at 100 wpm (600 opm). Operation at speeds of 66 wpm (404 opm) and 75 wpm (460 opm) is possible with gears which are not part of the AN/PGC–1 or TT–4(*)/TG.

4. Technical Characteristics

Type of installation	Tactical.
Power consumption:	
Motor	Approx 150 watts.
Signal circuit	Approx 10 watts.
Voltage requirements:	
Motor	105 to 125 volts dc or ac (50–60 cps, single phase).
Signal circuit	105–125 volts dc.
Service range (direct wire, 60 ma line current):	
60 wpm	25 miles.*
100 wpm	15 miles.*
Speed options:	
Words per minute (par. 3*c*)	60 (368.1 opm). 66 (404 opm). 75 (460 opm). 100 (600 opm).
Type of signals	Dc, neutral, 20 or 60 ma.
Signal code	Five unit, start-stop; stop impulse length equals start impulse length multiplied by 1.42.
Symbols	Standard communications.
Type of characters	English.
Printed characters per line	72.
Signal distortion tolerances:	
Transmitted signals	+5% max.
Received signals:	
Bias tolerance (maximum, marking or spacing):	
60 wpm opm	40 percent.
100 wpm	35 percent.
End distortion tolerance (maximum, marking or spacing):	
60 wpm	35 percent.
100 wpm	30 percent.
Orientation range:	
60 wpm	72 divisions on RANGE dial.
100 wpm	60 divisions on RANGE dial.
Type of paper feed	Friction.
Paper capacity	Single-, double-, or triple-copy roll; 8½-inch width, 4¾-inch maximum diameter. (Only single-copy recording paper is furnished as part of TT–4(*)/TG).
Suppression	Teletypewriters do not interfere with radio reception at frequencies between 0.35 and 150 megacycles when located 1 foot or more from radio antenna.
Motor:	
Type	Series-governed.
Speed	3,600 revolutions per minute.
Humidity tolerance	Equipment withstands high humidity and moisture as encountered in tropics; it is fungiproofed and resistant to corrosion.
Temperature ranges:	
Equipment in use	+32° F. (0° C.) to +132° F. (+55.6° C.).
Equipment in storage	−80 °F. (−62° C.) to +160° F. (+71.1° C.).

*Approximate range, using a field-wire, ground-return circuit (par. 23) with *both* field wire conductors connected in parallel (*both* wires used for metallic part of the circuit). Actual range will vary in accordance with the type of wire used and the type and condition of the circuit.

5. Components

a. Teletypewriter Set AN/PGC–1.

Quantity	Item	Height (in.)	Depth (in.)	Width (in.)	Unit wt (lb)
1	Teletypewriter TT–4A/TG or TT–4B/TG consisting of	24⅜	20⅞	16⅜	97
	1 teletypewriter bare unit (fig. 6)	11¼	18⅞	22½	44
	1 dust cover (fig. 5)	10¼	16¼	16	4½
	1 immersionproof cover (fig. 8)	10½	18	21	5¼
	1 case CY–694(*)/PGC–1 (fig. 11)	24⅜	20⅞	16⅜	43¼
	1 fuse, ⅛-amp, 250-volt (fig. 3).				
	1 fuse, 1.6-amp, 125-volt (fig. 3).				
1	Recording paper (fig. 3)	4½ dia roll		8½	3
1	Lamp, incandescent 15-w, 120-volt (fig. 3).				
1	Empty ribbon spool.				
1	Inking ribbon with spool (fig. 3).				
1	Tuning fork (180 vibrations per second).				
1	Worm gear (100-wpm) (fig. 7).				
1	Worm (100-wpm) (fig. 7).				
1	Set running spares (*b* below).				
2	Technical manual, TM 11–5815–206–12.				
1	Cable Assembly CX–1200/U (fig. 4)	45 long.			
1	Cable Assembly CX–1201/U (fig. 4)	45 long.			
1	Power Cable Assembly CX–1202/U (fig. 4)	72 long.			
1	Bag CW–356/U (fig. 4).				

b. Running Spares (fig. 3).

Quantity	Item
*6	Fuse, ⅛-amp, 250-volt.
*6	Fuse, 1.6-amp, 125-volt.
1	Lamp, incandescent, 15-w, 120-volt.
1	Roll of recording paper.
1	Spool of inking ribbon.
2	Electrical contact brush.

*1 clipped to cover of transmitter mechanism (fig. 6) and 5 wrapped separately.

6. Common Names

Item	Common name
Teletypewriter Set AN/PGC–1	Teletypewriter set.
Teletypewriters TT–4A/TG and TT–4B/TG	Teletypewriter.
Cases CY–694/PGC–1 and CY–694A/PGC–1	Case.

7. Description

The teletypewriter set consists of a lightweight teletypewriter (fig. 1) and a canvas bag which contains three cable assemblies (fig. 4).

a. The teletypewriter includes a send-receive page printer (fig. 5), a wooden transportation and storage case (fig. 1), a dust cover (fig. 5), an immersionproof cover (fig. 8), a set of running spares (fig. 3), a tuning fork, mounted within the dust cover and an accessory worm and worm gear (fig. 7). The teletypewriter base includes hooks for lashing the teletypewriter to a packboard for manual transport (fig. 8 and 9). The immersionproof cover is held to the teletypewriter base with spring-loaded clamps. The dust cover includes a window, copyholder, operating instruction panel, and hinged doors (fig. 5).

b. The major mechanical subdivisions of the teletypewriter include the keyboard transmitter (fig. 6), type-bar carriage, platen assembly, selector mechanism, paper storage assembly (fig. 7), the motor and accessory gears, all secured to the main frame assembly of the teletypewriter. A line terminal board and a control panel are mounted on the left-front corner of the teletypewriter under the dust cover (fig. 6).

8. Differences in Models

a. Teletypewriters TT–4A/TG and TT–4B/TG are identical operationally. The only physical differences of significance to the operator are—

(1) The key tops of the TT–4A/TG are round (fig. 6); the key tops of the TT–4B/TG are square (fig. 5 and 13).

(2) The dust cover of the TT–4A/TG is held to the base with springs and dust cover

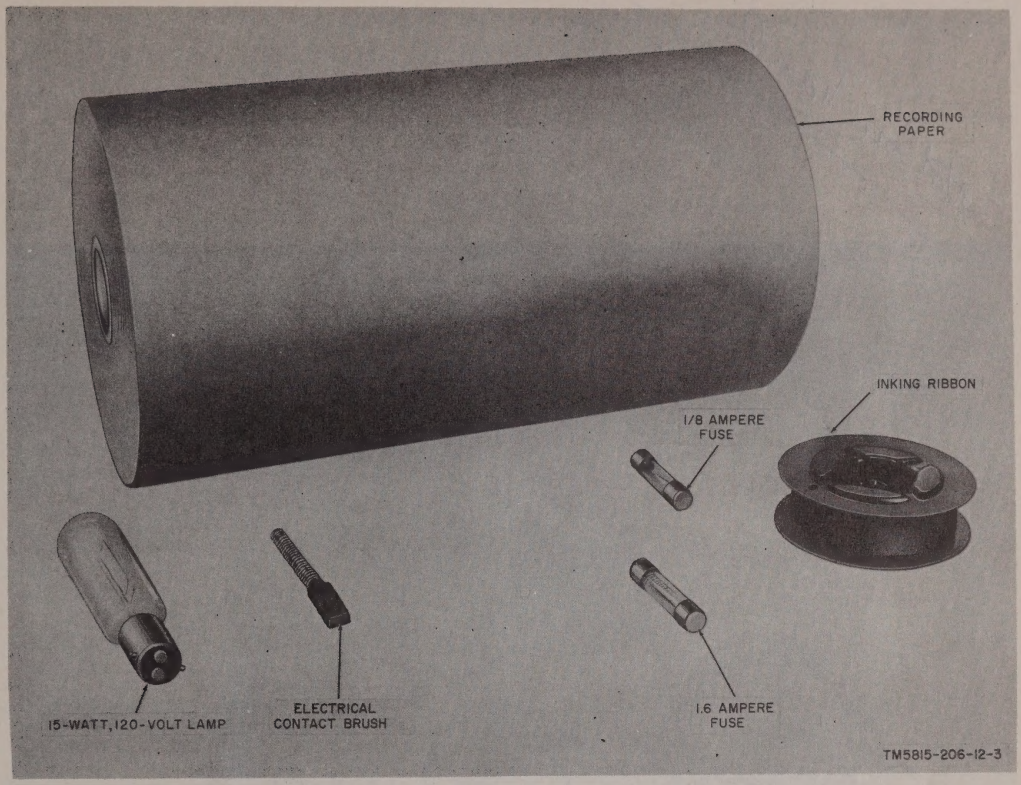


Figure 3. Running spares.

mounting studs (fig. 9); the TT–4B/TG dust cover is held to the base with a C-shaped cam lock on each side of the cover.

(3) The TT–4B/TG includes a blocking plate (fig. 12) which is used to prevent movement of the carriage-return driving gear during shipment. The blocking plate is not included with the TT–4A/TG.

(4) The location of that portion of the ribbon sensing lever that must be operated manually when removing and replacing the inking ribbon is as follows:

(*a*) On the TT–4B/TG, it is located toward the center of the type-bar carriage, below its associated ribbon cup (fig. 21).

(*b*) On the TT–4A/TG, it is located toward the outer side of the type-bar carriage, below its associated ribbon cup (fig. 6).

b. Cases CY–694/PGC–1 and CY–694A/PGC–1 are identical except that the CY–694A/PGC–1 includes straps and two wooden troughs for securing two rolls of recording paper to the lid of the case (figs. 10 and 11) instead of one roll as with the CY–694/PGC–1.

Not on hand
cant test

Figure 4. Bag CW-356/U and cable assemblies.

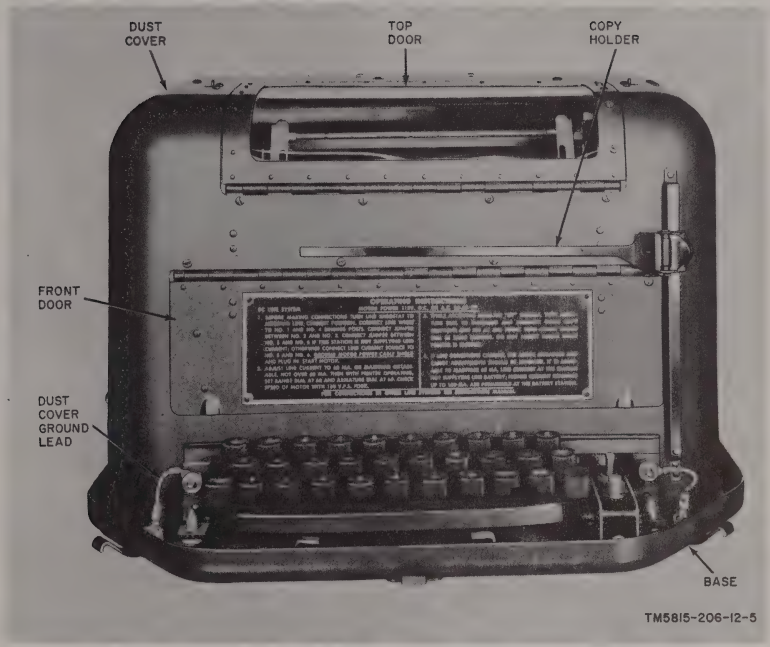


Figure 5. Teletypewriter TT–4(*)/TG, dust cover installed, front view.

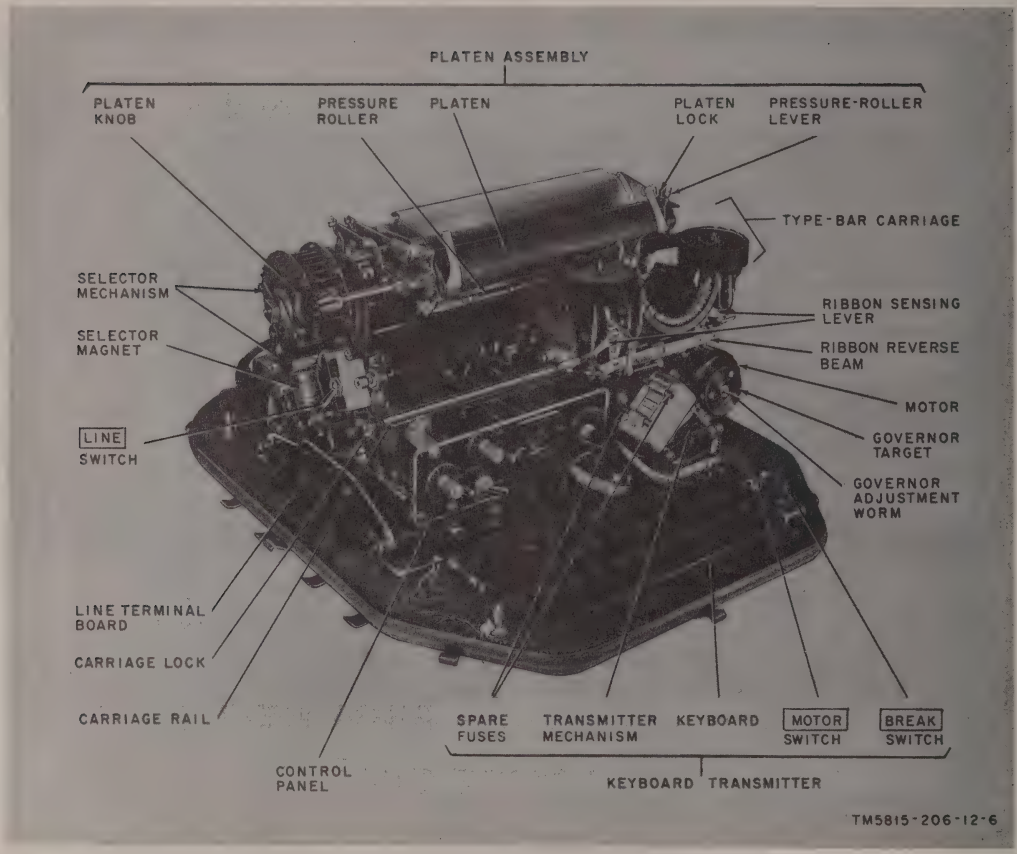


Figure 6. Teletypewriter TT–4(*)/TG, dust cover removed, front-left-side view.

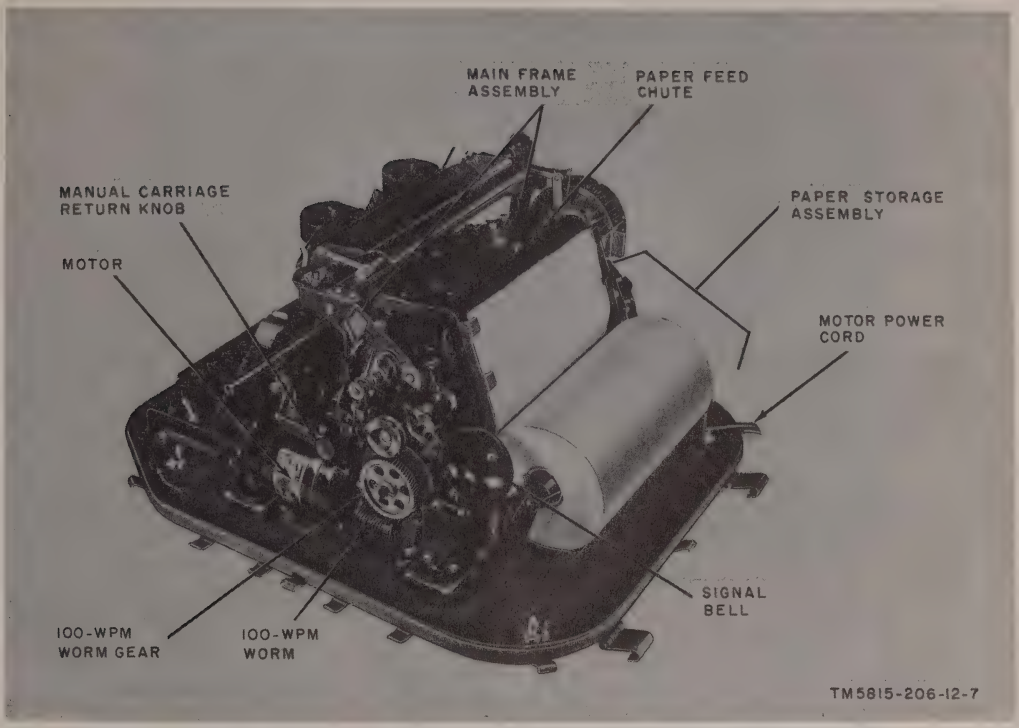


Figure 7. Teletypewriter TT–4(*)/TG, dust cover removed, rear-right-side view.

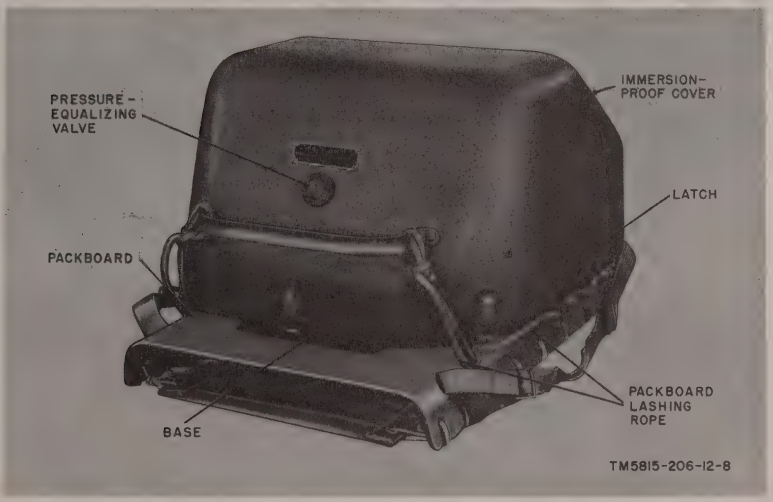


Figure 8. Teletypewriter TT–4(*)/TG, lashed to packboard.

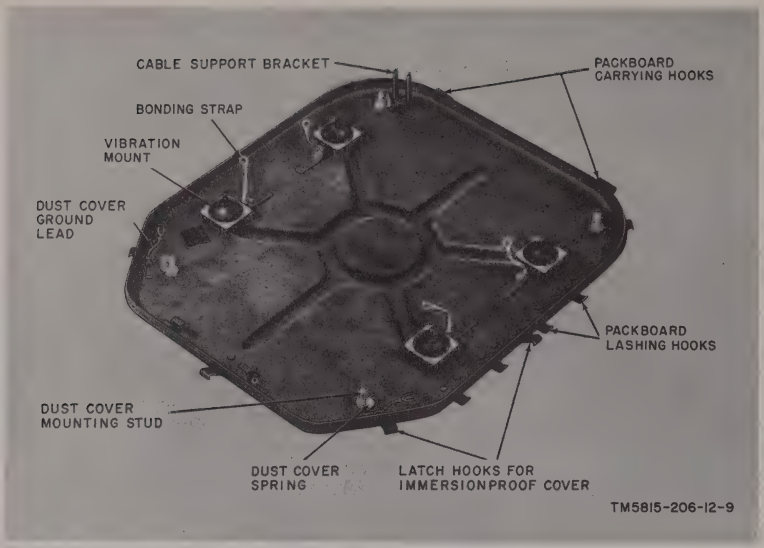


Figure 9. Base of Teletypewriter TT-4A/TG.

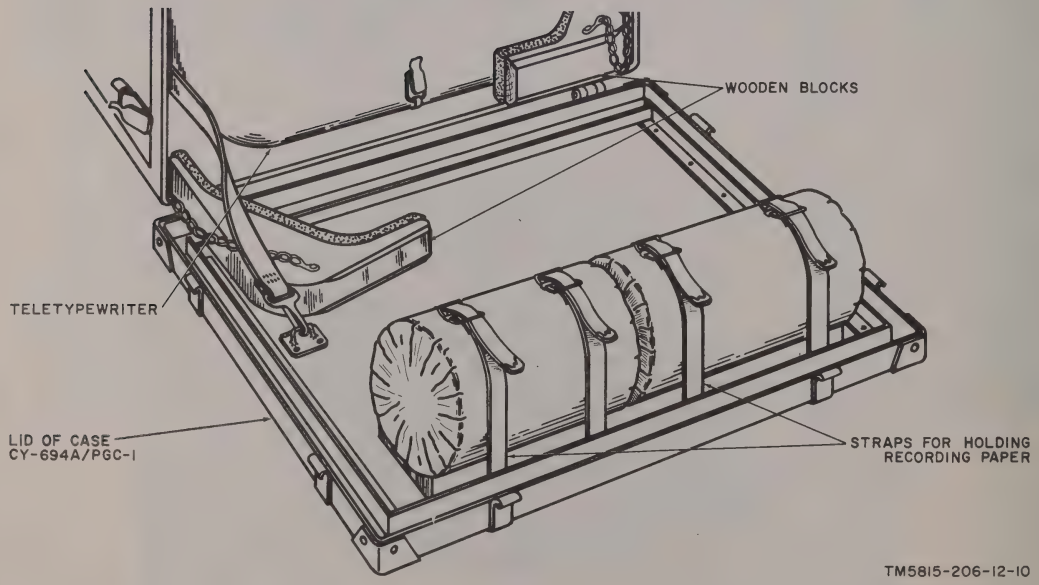


Figure 10. Method of securing recording paper to lid of Case CY–694A/PGC–1.

CHAPTER 2
INSTALLATION

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

9. Unpacking

a. Packaging Data. The factory packaging arrangement of the teletypewriter set (fig. 11) is suitable for either export or domestic shipment. The wooden box is 20½ inches high, 26¼ inches wide, and 26¼ inches deep. The volume of the wooden box is 9.5 cubic feet and the total weight of the packaged set is approximately 200 pounds. When only the teletypewriter is furnished, packaging is the same, except that Bag CW–356/U and the three cable assemblies (par. 5*a*) are not included.

b. Removing Contents (fig. 11).

(1) Cut the steel straps with a pair of tin snips or other appropriate tool.

(2) Remove the nails from the wooden box lid and remove the lid.

(3) Carefully turn the wooden box until the opening is down and lift the wooden box from the fiberboard carton.

(4) Carefully cut open one end of the fiberboard carton and remove Case CY–694(*)/PGC–1.

(5) If the equipment consists of the complete teletypewriter set, remove the technical manuals and Bag CW–356/U from the case. If only the TT–4(*)/TG is furnished, remove the technical manuals and the spare parts package.

(6) Unfasten the six latches on the top of the case, tilt the lid upward, and remove the teletypewriter.

10. Checking Unpacked Equipment

Check the equipment against the packing list. If a packing list is not available, check for the presence of all items listed in the table of components (par. 5). Remove the remaining shipping materials and check the teletypewriter (*a–h* below). If the equipment has been damaged, or if it is incomplete, refer to paragraph 2.

a. Unfasten the eight spring-loaded latches that hold the immersionproof cover to the teletypewriter base. Press the center of the pressure-equalizing valve (fig. 8) to equalize the internal and external pressure. Lift the cover from the base.

b. Loosen the round knurled nuts and disconnect the dust cover ground leads from the front corners of the dust cover (fig. 5).

c. Push the platen knob (fig. 6) inward until it is inside the dust cover.

d. For the TT–4A/TG, grasp the rear corners of the dust cover, raise the rear of the dust cover to free it from the rear mounting posts, and lift it straight upward. For the TT–4B/TG, turn the cam-lock assembly on each side of the dust cover and lift the cover straight upward.

e. Pivot the front access door upward and remove the tuning fork from the brackets on the inner side of the door. Remove the protective wrapping from the tuning fork, examine the fork for damage, and replace it in its brackets.

f. Remove the wooden blocks that have been used to prevent damage to the equipment during shipment. Check carefully to be sure that all blocks are removed.

g. Remove the tape from the following places:

(1) Signal-bell clapper at rear right-hand corner of teletypewriter.

(2) LTRS key lever and space bar on keyboard.

(3) Type basket above control panel.

(4) Motor power cord beneath paper-feed chute at rear of the teletypewriter.

h. Wipe all shipping material particles from the teletypewriter with a clean cloth.

11. Siting

Select an installation site that meets the following requirements:

a. Shelter. The teletypewriter must be oper-

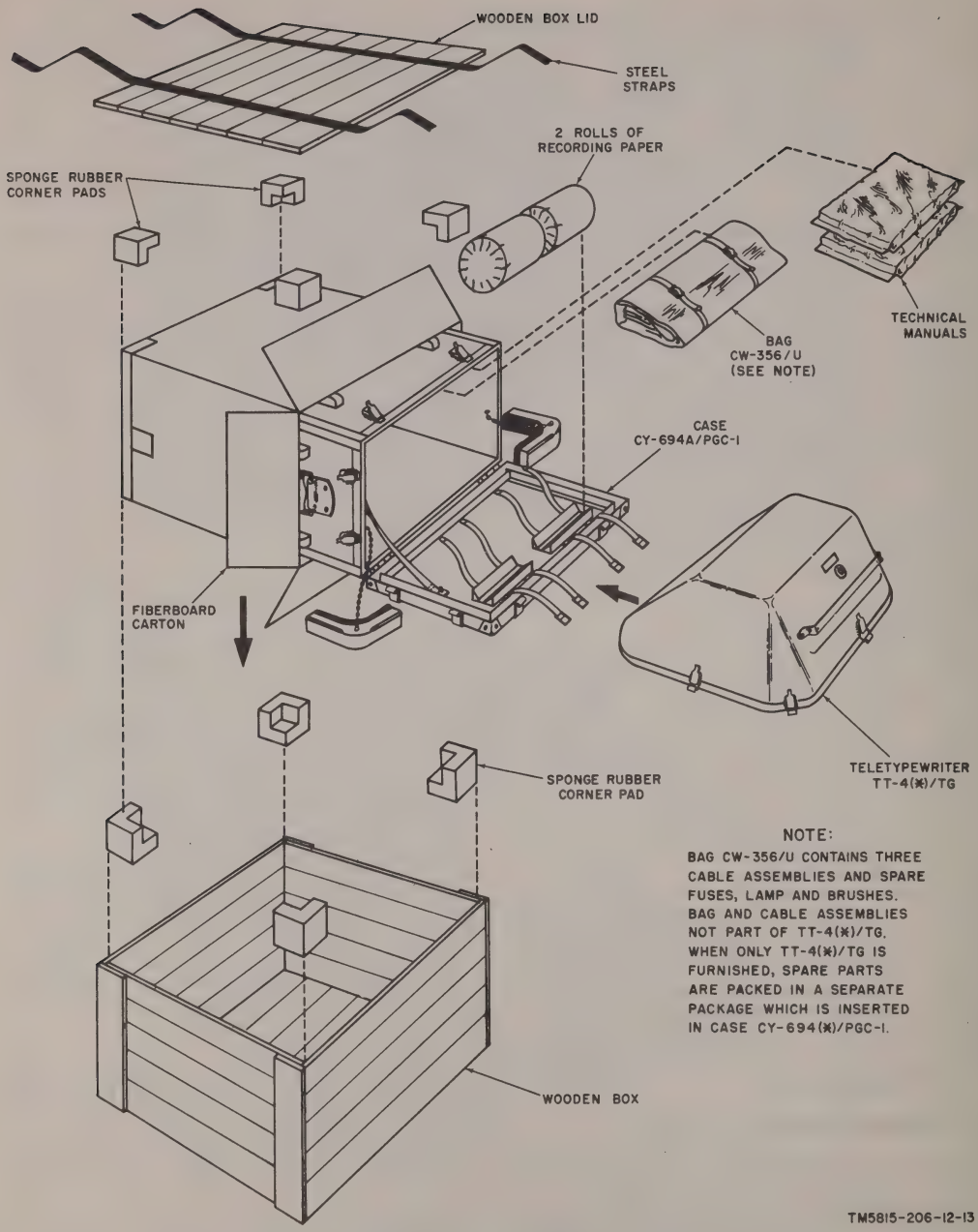

WOODEN BOX LID
STEEL STRAPS
2 ROLLS OF RECORDING PAPER
SPONGE RUBBER CORNER PADS
TECHNICAL MANUALS
BAG CW-356/U (SEE NOTE)
CASE CY-694A/PGC-1
FIBERBOARD CARTON
TELETYPEWRITER TT-4(*)/TG
SPONGE RUBBER CORNER PAD
NOTE:
BAG CW-356/U CONTAINS THREE CABLE ASSEMBLIES AND SPARE FUSES, LAMP AND BRUSHES. BAG AND CABLE ASSEMBLIES NOT PART OF TT-4(*)/TG. WHEN ONLY TT-4(*)/TG IS FURNISHED, SPARE PARTS ARE PACKED IN A SEPARATE PACKAGE WHICH IS INSERTED IN CASE CY-694(*)/PGC-1.
WOODEN BOX
TM5815-206-12-13

Figure 11. Method of packing teletypewriter set for export or domestic shipment.

ated in a shelter in which the temperature is kept warm enough to permit finger operation of the teletypewriter keys. A tent or a canvas-covered truck is adequate, but a heated building or closed truck is preferable as an operating site. Shelter requirements normally do not present any problems when the equipment is to be operated on shipboard or in aircraft.

b. Space. Each teletypewriter operating position requires a floor space area of approximately 3 feet by 5 feet.

c. Power. A source of 105- to 125-volt dc or ac (50- to 60-cps, single-phase) must be available for the teletypewriter motor. If power for the teletypewriter signal circuit is to be furnished locally, a source of 105–125-volt dc power must be available.

d. Lighting. Adequate lighting must be available for both day and night operation.

e. Ground Connection. A suitable ground connection point must be available to provide adequate protective grounding (par. 15*b*).

Section II. PRELIMINARY INSTALLATION PROCEDURE

12. General

a. Positioning Teletypewriter. Set the teletypewriter on a table or any raised, flat surface high enough for convenient operation of the keyboard, preferably a surface that permits knee space for the operator. If no suitable table or other operating surface is available, set the teletypewriter on its case (fig. 1). When the teletypewriter is transported to the installation site by packboard (fig. 8), and the case is not available, remove the immersionproof cover, lash the teletypewriter to the packboard, and set the packboard on any suitable supporting surface.

b. Installing Recording Paper and Inking Ribbon. Install a roll of recording paper (par. 31) and a spool of inking ribbon (par. 32).

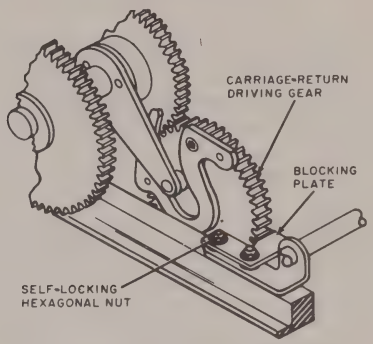
13. Checking Fuses

See that a good ¼-ampere fuse is in the LINE FUSE holder (fig. 17) and that a good 1.6-ampere fuse is in the MOTOR FUSE holder on the control panel (fig. 17). See that a good spare ⅛-ampere fuse and a good spare 1.6-ampere fuse are installed in the spare-fuse clips on the cover of the transmitter mechanism (fig. 6).

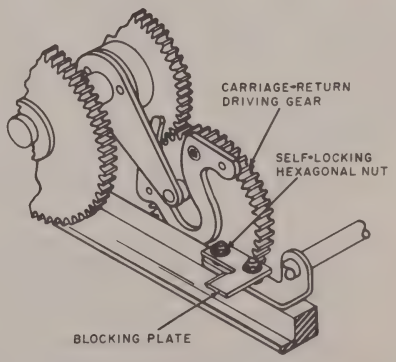
14. Unlocking Locking Devices

a. Blocking Plate. A blocking plate is provided (TT–4B/TG only) to lock the carriage-return driving gear firmly in place during shipment (A, fig. 12). Remove the two self-locking hexagonal nuts, set the blocking plate to the position shown in B, figure 12, and replace the nuts.

b. Platen Lock (fig. 6). The platen lock is used to lock the platen during transportation of the teletypewriter. To unfasten the platen lock, loosen the wingnut at the right-hand end of the platen, turn the locking lever counterclockwise until it clears the movable parts of the platen assembly, and tighten the wingnut.



A. BLOCKING PLATE IN SHIPPING POSITION



B. BLOCKING PLATE POSITIONED FOR TELETYPEWRITER OPERATION

TM2234-C3-5

Figure 12. Teletypewriter TT–4B/TG, blocking plate arrangements.

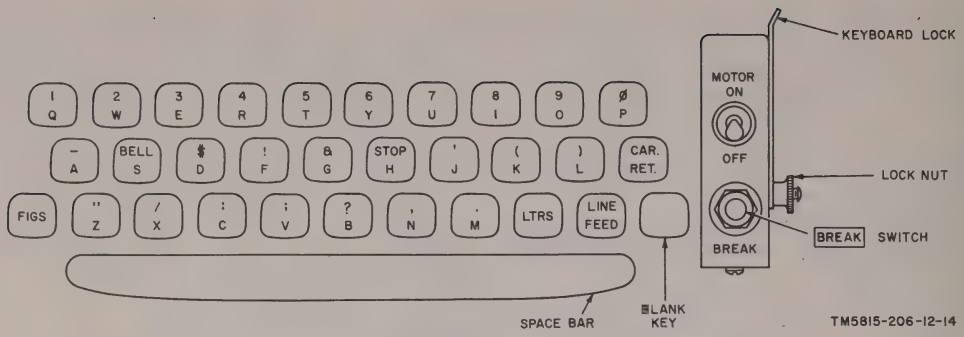


Figure 13. Teletypewriter TT–4B/TG keyboard.

c. Carriage Lock (fig. 6). The carriage lock is used to lock the type-bar carriage in the extreme left-hand position during transportation. To unfasten the carriage lock, loosen the wingnut on the left-hand end of the carriage rail, turn the lock until it hangs downward from the rail, and tighten the wingnut.

d. Keyboard Lock. If messages are to be transmitted from the teletypewriter, loosen the locknut (fig. 13), slide the keyboard lock toward the front of the teletypewriter, and tighten the locknut.

15. Motor Power and Protective Ground Connections

a. Motor Power Connection. Connect the motor power cord (fig. 7) to a source of 105- to 125-volt dc or ac (50- to 60-cps, single-phase) power.

b. Protective Ground Connection. Connect the braided meatl pigtail on the plug of the motor power cord to a suitable ground connection point ((1) and (2) below).

(1) When installing the teletypewriter in an aircraft or on a vessel, connect the pigtail to a metal structural member of the aircraft or vessel.

(2) If the teletypewriter is to be installed at a ground communication site, connect the pigtail to a water pipe or other similar low-resistance ground. Use a length of field wire or any available wire of equal or heavier gage. If a suitable ground connection point is not available, use one or more ground rods to obtain a low-resistance ground connection point. The ground rod (or rods) may be located as far as 1,000 yards from the teletypewriter. Select a low, damp site, preferably a spot where the soil is clay or loamy.

(*a*) Scoop out a hole about 6 inches in diameter and about 6 inches deep.

(*b*) Drive a rod vertically into the hole until the top of the rod is approximately 3 inches below the surface of the earth. Swing the driving hammer carefully to avoid whipping of rod (whipping results in poor contact between the rod and the soil).

(*c*) Connect one end of a ground lead to the ground rod. Be sure to obtain a good bond between the rod and the lead. Connect the other end of the lead to the pigtail on the plug of the motor power cord.

(*d*) Saturate the earth around the top of the rod with water, fill the hole around the rod with earth, and add more water.

(*e*) If the soil in the area normally is not moist, drive another ground rod approximately 15 feet from the first rod and connect it to the first rod. If the soil is exceptionally dry, drive several additional rods to form two rows of rods with a minimum of ten feet between the rows and connect the rows in parallel. Add water occasionally (daily, if necessary) to maintain good contact between the ground rods and the soil.

16. Adjusting Motor Speed

a. Remove the tuning fork from the clips on the rear of the front door on the dust cover.

b. Turn the MOTOR switch to ON (fig. 6). Allow the motor to run for several minutes.

c. Strike the tuning fork *gently* against the hand to set it into vibration.

d. Hold the vibrating end of the tuning fork close to one eye and look through the slots in the vibrating shutter to view one of the white dots on the governor target (fig. 6).

e. Make no adjustment if the selected spot appears to be motionless. If the spot appears to be moving clockwise, pull the end of the governor adjustment worm outward. Release the worm when the apparent clockwise motion of the spot has stopped. If the spot appears to be moving counterclockwise, push the end of the governor adjustment worm inward until the apparent counterclockwise motion of the spot has stopped. To avoid overadjustment, release the worm just before the spot appears to come to a halt.

f. Replace the tuning fork in its storage clips on the rear of the front door. Be sure to insert the fork between the clips and the springs. Do not insert the fork between the springs and the door.

Note. The motor speed adjustment procedure is the same for all operating speeds of the teletypewriter (par. 3). If the teletypewriter is to be operated at a speed other than 60 wpm, the appropriate worm and worm gear must be installed. This procedure is beyond the scope of the operator's duties and must be performed by higher level maintenance personnel.

Section III. FINAL INSTALLATION PROCEDURE

17. Installation Options

a. Installation for Half-duplex Operation (pars. 19 and 20). When installed for half-duplex operation, a teletypewriter is connected to one or more other teletypewriters and all can send messages to and receive messages from each other (not simultaneously). The transmitted messages are printed at all teletypewriters, including the sending teletypewriter.

b. Installation for Receive-only Operation (par. 21). When installed for receive-only operation, the teletypewriter can receive messages from other stations only. Messages cannot be sent from a teletypewriter installed for receive-only operation.

c. Installation for Full-duplex Operation (par. 22). When a teletypewriter is installed for full-duplex operation, messages can be sent from the teletypewriter but a copy of the transmitted messages is not printed by the sending teletypewriter. The page printer portion of the teletypewriter is used only to print messages received from other transmitting stations.

18. Signal Line and DC Power Connections, General

Terminals 0 through 6 on the line terminal board (figs. 6 and 14) are provided for the connection of the signal lines and a dc power cord. SEND terminals 0, 1, and 2 are associated with the keyboard transmitter portion of the teletypewriter. REC terminals 3 and 4 are associated with the page printer portion. BATTERY terminals 5 and 6 are used for connection of dc power for the signal circuit. The proper connections vary in accordance with the operational requirements of the individual station (pars. 17 and 19–23). Before making any connections to the line terminal board, proceed as follows:

a. Turn the LINE INCREASE knob (fig. 17) fully counterclockwise.

b. Set the LINE switch (fig. 6) to DC LINE for 60-ma signal circuit operation (operation in a dc system (fig. 2)), or to VOICE FREQ LINE for 20-ma signal circuit operation (operation in a voice-frequency system).

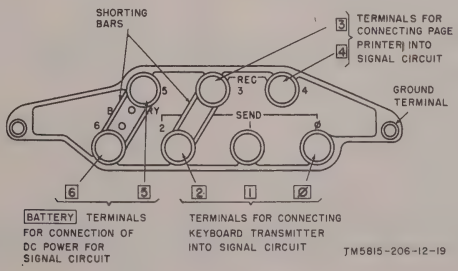


Figure 14. Line terminal board.

c. Check to be sure the teletypewriter is properly grounded (par. 15).

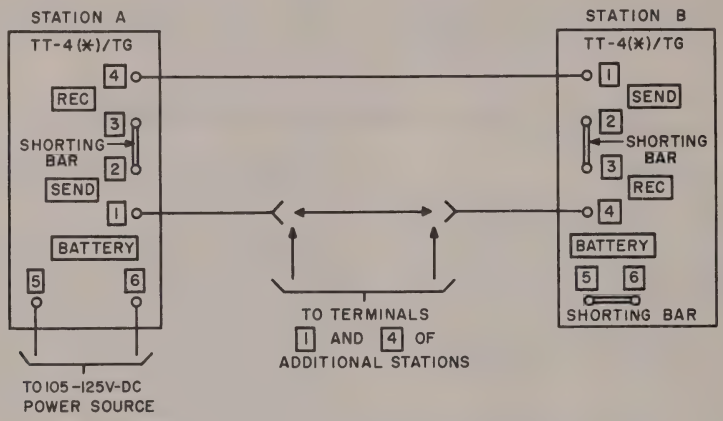
Note: Send terminal 0 is used for an unusual application of the TT–4(*)/TG which is not covered in this manual. Installation for this application is performed by higher echelon personnel. Power Cable Assembly CX–1202/U (fig. 4) is not supplied as part of the TT–4(*)/TG. If only the TT–4(*)/TG is furnished, and a local source of dc signal circuit power is to be used, obtain a length of 2-conductor rubber-covered cable and make a suitable substitute for the CX–1202/U.

19. Connections for Half-Duplex Operation (Dc System)

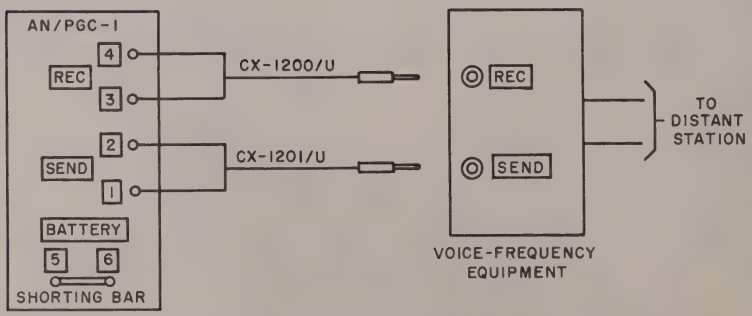
(A, fig. 15)

a. Loosen the knurled nuts of terminals 2 and 3 (fig. 14). Connect the associated shorting bar across terminals 2 and 3 and tighten the nuts. Perform the steps in *b* or *c* below as applicable.

b. If power for the signal circuit is to be supplied locally (station A; A, fig. 15), connect one of the two signal lines to terminal 1 and the other



A. HALF-DUPLEX DC SYSTEM CONNECTIONS



B. HALF-DUPLEX VOICE-FREQUENCY SYSTEM CONNECTIONS

TM5815-206-12-16

Figure 15. Connections for half-duplex operation.

line to terminal 4. Disconnect the shorting bar from terminals 5 and 6 and connect Power Cable Assembly CX–1202/U (fig. 4) to these terminals. Connect the plug of the power cable to a 105–125-volt, dc power source.

Caution: **Observe the D.C. MILLIAMPERES meter (fig. 17) when connecting the power cable to the dc power source. If the meter pointer moves to the left of zero, disconnect power, reverse the leads connected to terminals 5 and 6, and reconnect power.**

c. If power for the signal circuit is to be supplied by the distant station (station B; A, fig. 15), check to be sure the shorting bar is connected across terminals 5 and 6 and connect the two signal lines to terminals 1 and 4. Reverse the signal lines if the meter pointer moves to the left of zero when the signal circuit is energized.

20. Connections for Half-duplex Operation (Voice-frequency System)

(B, fig. 15)

a. Connect the shorting bar across terminals 5 and 6 (fig. 14).

b. Loosen the knurled nuts of terminals 2 and 3 and pivot the shorting bar that is attached to terminal 3 away from terminal 2. Connect Cable Assembly CX–1201/U (fig. 4) to terminals 1 and 2.

Note. Cable Assembly CX–1201/U is equipped with a black telephone-type plug at one end and Cable Assembly CX–1200/U has a similar type red plug.

c. Connect Cable Assembly CX–1200/U to terminals 3 and 4.

d. Insert the red plug in the REC jack of the voice-frequency equipment, and insert the black plug into the SEND jack. Reverse the leads connected to terminals 3 and 4 if the pointer of the D.C.MILLIAMPERES meter (fig. 17) moves to the left of zero when the REC signal circuit is energized. Refer to paragraph 43 for additional installation details if the voice-frequency equipment is the TH–5/TG; for information on voice-frequency equipment other than TH–5/TG, refer to the technical manual that covers the equipment.

21. Connections for Receive-only Operation

(A, fig. 16)

When a teletypewriter is connected for receive-only operation, the source of power for the signal line normally is located at the transmitting station. Connect one of the station's two signal lines to terminal 3 of the line terminal board (fig. 14) and

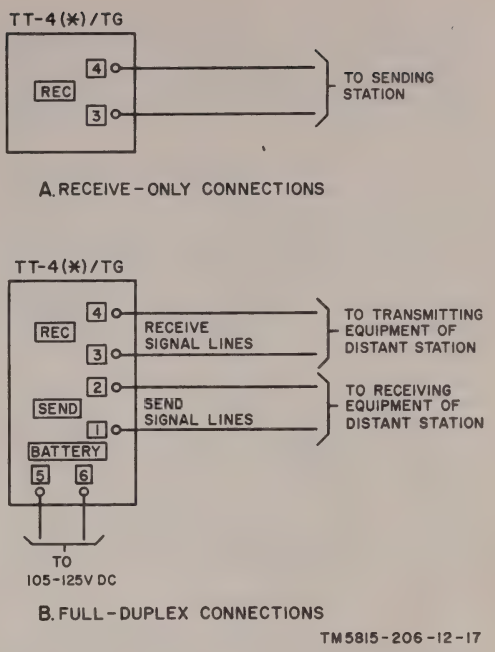


Figure 16. Connections for receive-only and full-duplex operations.

the other signal line to terminal 4. Reverse the connections to terminals 3 and 4 if the D.C. MILLIAMPERES meter pointer moves to the left of zero.

22. Connections for Full-duplex Operation

(B, fig. 16)

a. Loosen the nuts of terminals 1 through 6 of the line terminal board (fig. 14) and move both shorting bars on the line terminal board to the vertical position (lower end of bars not in contact with any lower terminal).

b. Connect one of the two *receive* signal lines to terminal 3; connect the other signal line to terminal 4. If the pointer of the D.C. MILLIAMPERES meter (fig. 17) does not move to the right, reverse the connections to terminals 3 and 4.

c. Connect either of the *send* signal lines to terminal 1; connect the other signal line to terminal 2.

d. Connect the two leads of Power Cable Assembly CX–1202/U (fig. 4) to terminals 5 and 6. Connect the plug on the other end of the CX–1202/U to a 105–125-volt dc power source.

Note. When connected for full-duplex operation (*a–d* above), each station normally provides power only for the

signal circuit connected to its SEND terminals (send circuit). To provide power at a station for the receive circuit also, connect one of the receive signal lines to terminal 6 (instead of terminal 3 (*b* above)), connect a jumper from terminal 3 to terminal 5, and make all other connections exactly as described in *a* through *d* above. See caution, par. 19*b*.

23. Connections for Ground-return Signal Circuit

A ground-return signal circuit includes only one metallic path between two stations; the earth is used as the return path to complete the circuit. To establish a ground-return signal circuit, proceed as follows at each station:

a. Establish a good ground connection point (par. 15*b*(2)).

b. Connect an insulated wire from the ground connection point to one of the two line terminal board terminals that are associated with the signal circuit.

c. Connect the signal line to the other terminal associated with the signal circuit.

24. Line Current Adjustment

For circuit line-up purposes, one of the stations (normally the station of highest authority) is designated the control station and the others are designated noncontrol stations. Be sure the LINE INCREASE knob (fig. 17) is fully counterclockwise at the control station and fully clockwise at all noncontrol stations before beginning the line current adjustment procedure during installation of the teletypewriter.

a. Half-duplex Operation (*Dc System*) (A, fig. 15).

(1) The operator at the control station must slowly turn the LINE INCREASE knob clockwise until the pointer of the D.C. MILLIAMPERES meter (fig. 17) indicates 75 on the meter scale.

(2) If only one station is connected to the control station teletypewriter, the operator at the noncontrol station must slowly turn the LINE INCREASE knob counterclockwise until the pointer of his meter indicates 60 on the meter scale. If more than one noncontrol station is in the circuit, the operator at each noncontrol station, in turn, must turn his LINE INCREASE knob counterclockwise slowly to decrease the meter reading in equal amounts until the meter indicates 60 (for example, in a three-station circuit, each of the two noncontrol stations would decrease the current reading approximately 7½ ma).

b. Half-duplex Operation (*Voice-frequency System*) (B, fig. 15). Turn the LINE INCREASE knob clockwise slowly until the pointer indicates 20 milliamperes on the meter scale.

c. Full-duplex Operation (B, fig. 16). Turn the LINE INCREASE knob clockwise slowly until the pointer indicates 60 milliamperes on the meter scale.

Note. When a TT–4(*)/TG is installed for full-duplex operation (B, fig. 16), the LINE INCREASE knob is used to adjust the value of current in the receive circuit only (circuit that is connected to terminals 3 and 4). The value of current in the send circuit (circuit that is connected to terminals 1 and 2) must be adjusted by the operator at the distant end of that circuit.

d. Receive-only Operation (A, fig. 16). Turn the LINE INCREASE knob clockwise slowly until the pointer indicates 60 ma on the meter scale.

25. ARMATURE and RANGE Dials Adjustment

(fig. 17)

Note. Be sure the line current is of the proper value (par. 24) before this adjustment is made.

The ARMATURE and RANGE dials (fig. 17) are associated with the page printer portion of the teletypewriter. *Continuous* reception of test signals (usually alternate R and Y signals, transmitted from the distant station) is necessary for adjustment of these dials. Arrange to have these signals transmitted from the distant station and adjust the dials as described in *a* through *d* below.

a. ARMATURE Dial Preliminary Adjustment.

(1) Loosen the RANGE dial lock, set the RANGE dial at 65, and tighten the dial lock.

(2) Loosen the ARMATURE dial lock and turn the ARMATURE dial counterclockwise *slowly* until the page printer begins to print errors. Note the dial position at that point.

(3) Turn the ARMATURE dial clockwise *slowly* until the page printer resumes printing correctly. Continue turning the dial clockwise until the page printer again begins to print errors. Note the dial position at that point.

(4) Set and lock the ARMATURE dial midway between the two readings ((2) and (3) above).

b. RANGE Dial Preliminary Adjustment.

Caution: **Never change the position of the RANGE dial while the page printer is idle.**

(1) Loosen the RANGE dial lock and turn the RANGE dial counterclockwise *slowly* until the page printer begins to print errors. Note the dial position at that point.

(2) Turn the RANGE dial clockwise *slowly* until the page printer resumes printing correctly. Continue turning the dial clockwise until it again begins to print errors. Note the dial position.

(3) Set and lock the RANGE dial midway between the two readings (1) and (2)) above).

c. ARMATURE Dial Final Adjustment. This adjustment is identical with the ARMATURE dial preliminary adjustment (*a* above) except that it is performed *after* the RANGE dial preliminary adjustment (*b* above) and that step in *a*(1) above is omitted.

d. RANGE Dial Final Adjustment. This adjustment is identical with the RANGE dial preliminary adjustment (*b* above) except that it is performed *after* the ARMATURE dial *final* adjustment.

26. Installation Final Test

After installation, perform a complete operational test of the teletypewriter before beginning the transmission of official traffic.

a. Make the checks listed in the equipment performance check list (par. 39).

b. Have the distant operator transmit a test message and observe the typewritten copy. The conventional test message is as follows: "THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG'S BACK 1234567890–$!&"( )"/-:;?,.".

c. Transmit the same test message to the distant station for a performance test of the equipment at the distant station.

CHAPTER 3
OPERATION

Section I. CONTROLS AND INDICATORS

27. Controls

a. Keyboard Controls (fig. 13).

Control	Function
FIGS key	When pressed, platens of all teletypewriters in the circuit are moved to figures-shift position for typing of upper-case symbols or performance of mechanical operations indicated above letters on alphabet keys.
LTRS key	When pressed, after use of FIGS key, platens of all teletypewriters in the circuit are moved to letters-shift position for typing of letters.
LINE FEED key	When pressed, paper of all teletypewriters in the circuit is advanced 1- or 2-line spaces on platen. Adustable for single or double line feed.
CAR. RET. key	When pressed, type-bar carriages (fig. 6) of all teletypewriters in the signal circuit are moved to left margin of paper.
BELL key	When pressed while platen is in figures-shift position, signal bell is rung to signal teletypewriter operators.
STOP key	When pressed while platen is in figures-shift position, stops motors of all interconnected teletypewriters that are equipped with a motor-stop feature.
Alphabet keys	When platen is in letters-shift position, pressing of each alphabet key causes printing of letter shown on keytop. When platen is in figures-shift position, pressing of each alphabet key causes printing of symbol illustrated on key stop, ringing of signal bell (S key), or stopping of motor (H key).
Blank key	When pressed, causes transmission of special-purpose blank code group.
Space bar	When pressed and instantly released, causes type-bar carriage to move one space to the right. When held down, causes type-bar carriage to continue moving to the right until right margin is reached.
MOTOR switch	Turns motor on and off for initial starting and complete shut down of teletypewriter.
BREAK switch	While pressed (half-duplex operation only (par. 17)) opens signal circuit to interrupt transmission from other teletypewriters. Also restarts motors when motors were stopped by depression of STOP key.
Keyboard lock	When clamped in rearward position, prevents transmission from keyboard transmitter. Transmission possible when clamped in forward position.

b. Control Panel Controls (fig. 17).

Control	Function
LINE INCREASE knob.	Used to adjust signal line current. Turn clockwise to increase current. Turn counterclockwise to decrease current.
ARMATURE dial	Used to adjust tension of selector-magnet armature spring.
ARMATURE dial lock.	Used to lock ARMATURE dial at selected dial position. Turn clockwise to lock; counterclockwise to unlock dial.
RANGE dial	Used to adjust receiving mechanism for best performance.
RANGE dial lock	Used to lock RANGE dial at selected position. Turn clockwise to lock; counterclockwise to unlock dial.
LIGHT switch	Used to switch illuminating lamp on or off.

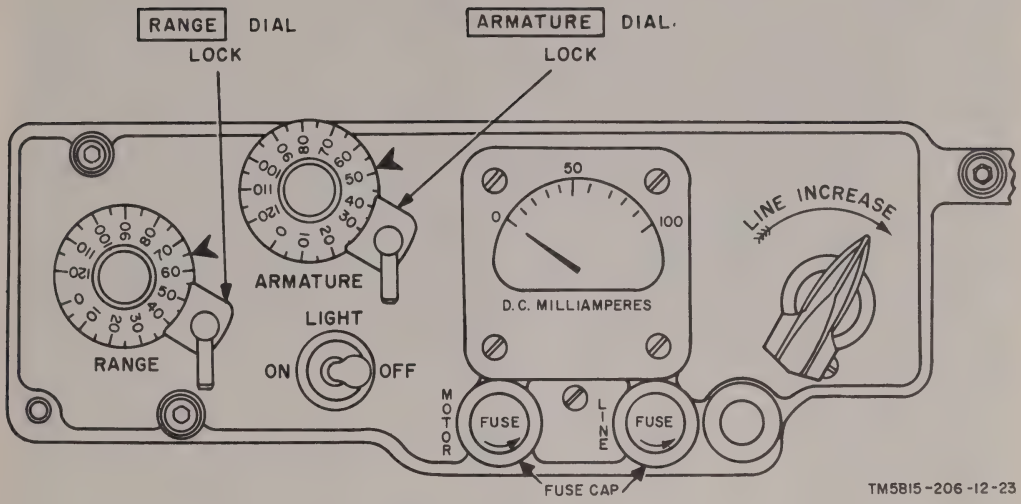


Figure 17. Control panel.

c. Miscellaneous Controls.

Control	Function
LINE switch (fig. 6).	Used to adjust internal wiring for type of incoming signals. Set to VOICE FREQ LINE position for operation with 20-ma signals. Set to DC LINE for operation with 60-ma signals.
Platen knob (fig. 6).	Used to turn platen for manual feeding of recording paper.
Pressure roller lever fig. 18).	Used to release pressure of pressure rollers against platen.
Platen lever latch (TT–4B/TG only (fig. 18)).	Used to lock pressure roller lever in either pressure or release position.
Single-double line feed lever (fig. 18).	Used to adjust line-feed mechanism for single or double line feed.
Ribbon spool locks (fig. 19).	Used to lock ribbon spools in spool cups.
Manual carriage return knob (fig. 7).	When pressed inward, function is same as CAR. RET. key (*a* above), but does not affect other teletypewriters.

28. Indicators

Indicator	Function
Margin bell	Rings automatically on 66th character to warn operator that end of line is near.
Signal bell	Used to signal distant operator.
D.C. MILLIAMPERES meter (fig. 17).	Indicates amount of current in signal line.

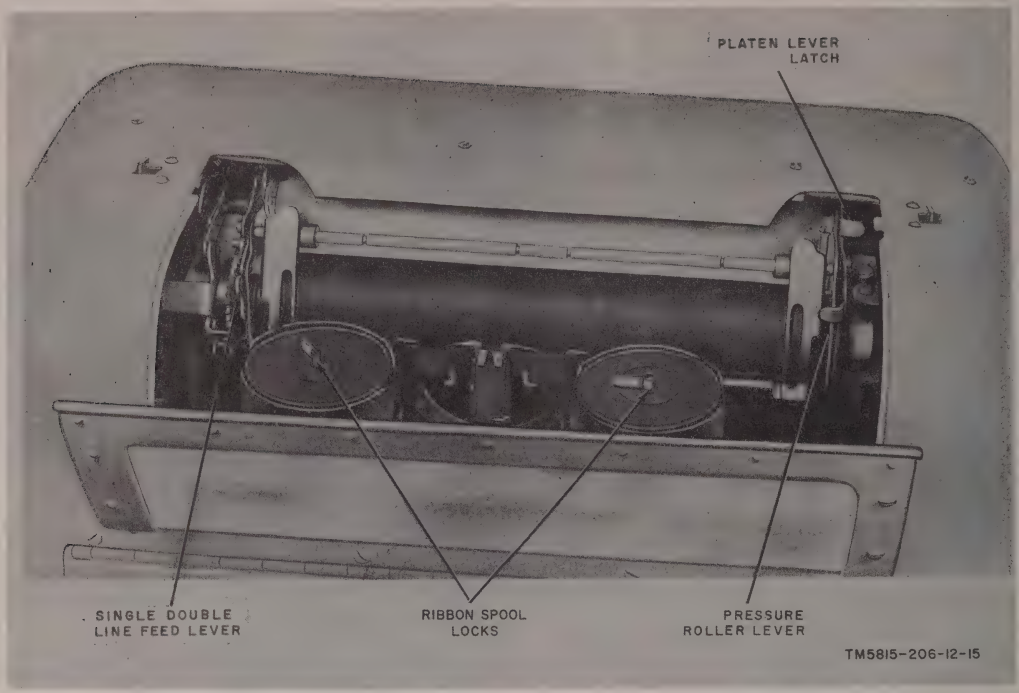


Figure 18. Platen controls, TT–4B/TG.

Section II. OPERATION UNDER USUAL CONDITIONS

29. Modes of Operation

Teletypewriter TT–4(*)/TG includes two major operating units: the keyboard transmitter and the page printer. These units may be used for full-duplex, receive-only, or half-duplex operation (fig. 19), as determined by the installation procedure. The performance capabilities of each mode of operation are described in paragraph 17. To operate the teletypewriter for any of the modes, perform the following:

a. Preliminary starting procedure (par. 30).
b. Starting procedure (par. 33).
c. Operating procedure (par. 34).
d. Stopping procedure (par. 35).

30. Preliminary Starting Procedure

a. Check to be sure that the motor power cord is plugged in to the power outlet. If Cable Assemblies CX–1200/U and CX–1201/U (fig. 4) are used, check to be sure that their plugs are fully inserted into the appropiate jacks of the associated equipment. If Power Cable Assembly CX–1202/U is used, be sure that its plug is inserted fully into the dc power receptacle and that the D.C. MILLIAMPERES meter (fig. 17) indicates a line current value of 60 milliamperes (ma) if the LINE switch (fig. 6) is in the DC LINE position or 20 ma if the LINE switch is in the VOICE FREQ LINE position.

b. Check the supply of recording paper. If necessary, install a new roll of recording paper (par. 31).

c. Check the condition of the inking ribbon. Replace the ribbon if it is worn or frayed (par. 32).

d. Push the single-double line-feed lever (fig. 18) to the rearward position for single line feed; pull it to the forward position for double line feed.

31. Installing Recording Paper

a. Remove the dust cover as follows:

(1) Loosen the two knurled nuts and disconnect the dust cover ground lead from

each front corner of the dust cover (fig. 5).

(2) If the teletypewriter is a TT–4A/TG, push the front and then the rear of the dust cover upward slightly to release it from the four dust cover springs (fig. 9). If it is a TT-4B/TG, turn the cam-lock knob at the lower edge of each side of the dust cover. Press the platen knob (fig. 6) inward and lift the dust cover straight upward from the base.

b. Check the amount of recording paper that is on the roll mounted in the teletypewriter. If the paper supply is not low, replace the dust cover. If the paper supply is low, install a new roll of recording paper as follows:

(1) Push the ends of the two retaining springs (fig. 20) upward and lift the paper roll shaft from the slots in the two mountings.

(2) Insert the paper roll shaft into the new roll of recording paper.

(3) Hold the roll as shown in figure 20. Push upward to raise the retaining springs and slide the end pins of the paper roll shaft into the slots in the mountings. Be sure the paper, when unwound from the roll, is drawn upward between the roll and the paper chute.

(4) Pull the end of the paper through the paper chute, pass the paper downward behind the platen (fig. 6), and turn the platen knob until several inches of paper appear at the front of the platen. Do not allow the paper to wind around the platen and downward behind it again.

(5) If the paper is not centered on the platen, push the pressure roller lever of the TT–4A/TG slightly to the right and then forward to the pressure release position or lift the platen lever latch (fig. 18) of the TT–4B/TG, move the pressure roller lever forward, and lower the platen lever latch. Center the paper on the platen and restore the pressure roller lever to the rearward (pressure) position.

(6) Replace the dust cover and connect the cover ground leads to the front corners of the cover (fig. 5).

(7) Open the top door of the dust cover, turn the platen knob until the end of the paper extends over the top of the cover, and close the cover.

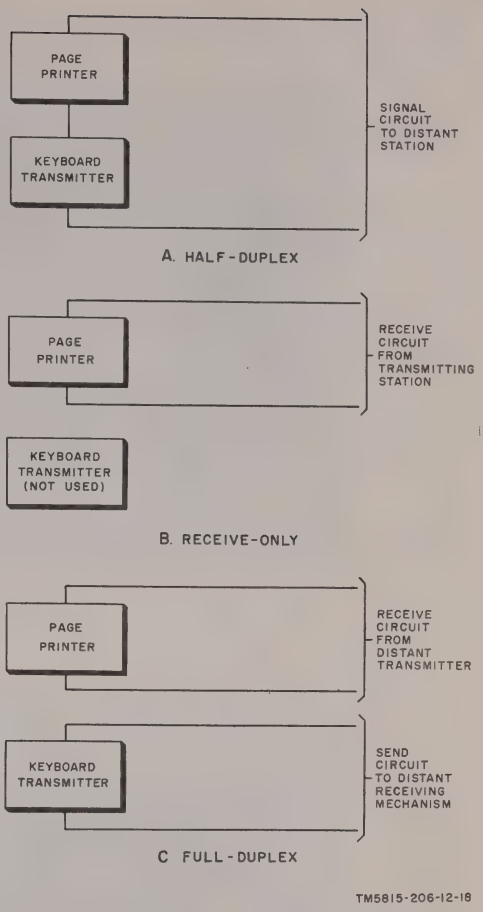


Figure 19. Modes of operation.

32. Installing or Changing Inking Ribbon

Perform the steps in *a*, *b*, and *d* below for initial installation of an inking ribbon on the teletypewriter. To replace a worn inking ribbon, perform the step in *c* below also.

a. If the teletypewriter is a TT–4A/TG, remove the dust cover (par. 31*a*). If it is a TT–4B/TG, swing the top door forward (fig. 18) to permit access to the inking ribbon.

b. Press and release the CAR. RET. key (fig. 13) and then hold down the space bar until the typebar carriage has moved to the middle of the platen.

c. Remove the old ribbon as follows:

(1) Hold one end of the ribbon reverse beam

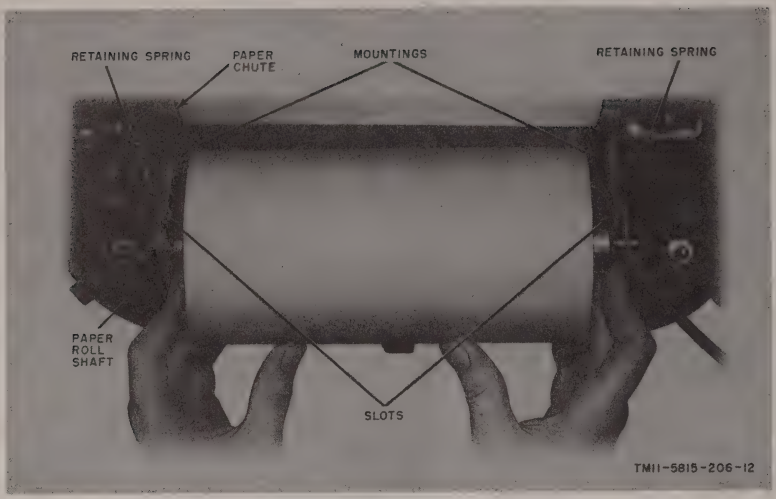


Figure 20. Installing roll of recording paper.

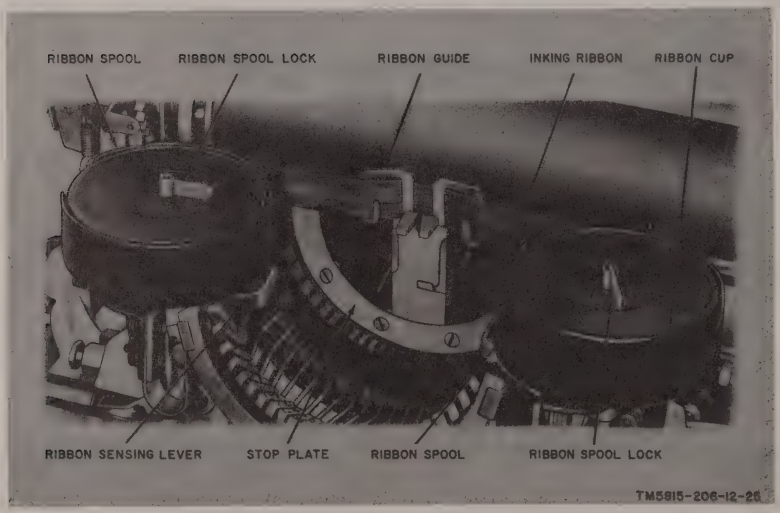


Figure 21. Inking ribbon mounted in TT–4B/TG.

(fig. 6) midway between the upper and lower positions and turn one of the ribbon spool locks (fig. 21) manually until all the ribbon is wound on one spool.

(2) Unhook the old ribbon from the ribbon guide.

(3) Raise both ribbon spool locks to the vertical position.

(4) Operate the ribbon sensing lever that is below the empty spool and lift the empty spool from the teletypewriter. To operate the ribbon sensing lever of the TT–4A/TG (fig. 6), press the lever. To operate the ribbon sensing lever of the TT–4B/TG (fig. 21), lift the lever.

(5) Detach the end of the old ribbon from the empty spool.

(6) Remove the full spool ((4) above).

d. Install a new ribbon as follows:

(1) If the new ribbon is wound counterclockwise on the new spool (when viewed from the top), place the new spool in the right-hand ribbon cup; if wound clockwise, place it in the left-hand ribbon cup.

Note. The larger opening in the ribbon spool is on the bottom of the spool.

(2) Operate the ribbon sensing lever (*c*(4) above) and turn the spool until the two lugs on the ribbon spool shaft are engaged with the two slots in the bottom of the spool.

(3) Pass the end of the ribbon through the slot in the ribbon spool and fasten the end to the empty spool. Of the two spearhead fasteners on the empty spool; use the one which points in the direction that the spool will turn when winding the ribbon on the spool. Stab the spearhead through the ribbon about 1 inch from the end and install the empty spool ((2) above).

Caution: **Be sure the ribbon is not twisted at any point between the two ribbon spools.**

(4) Engage the ribbon in the ribbon guide as shown in figure 21. Turn one of the spools until the ribbon is taut between the spools. Lower both ribbon spool locks to the locking position.

33. Starting Procedure

Before starting the teletypewriter, be sure the preliminary starting procedures (par. 30) have been accomplished.

a. If the MOTOR switch (fig. 6) is in the ON position, press the BREAK switch for a few seconds and release it. If the MOTOR switch is in the OFF position, move it to ON.

b. Lift the front door to expose the control panel (fig. 17) and move the LIGHT switch to ON.

34. Operating Procedure

a. Transmitting Messages. Message transmission is possible only when the teletypewriter is installed for either half-duplex or full-duplex operation. To transmit, operate the keys of the keyboard (fig. 13) in a manner similar to that used when typing with an ordinary typewriter except as follows:

(1) Press the CAR. RET. key to return the type-bar carriage to the left-hand margin.

(2) Press the LINE FEED key to move the recording paper upward for the printing of a new line.

(3) Press the FIGS key to move the platen to the figures-shift position.

(4) Press the LTRS key to move the platen to the letters-shift position.

(5) Press the FIGS key and then the BELL key to signal the distant operator.

(6) Hold down the space bar to cause the type-bar carriage to move from left to right without printing. Release the space bar when the carriage has reached the point at which printing is to begin.

b. Receiving Messages. Incoming messages are received and printed automatically by the page printer. Occasionally, during reception, make the following checks:

(1) Check the printed copy to be sure that the page printer is operating properly.

(2) Check the recording paper to be sure that it is properly centered on the platen and that the paper supply is not running low.

Note. As the end of the paper nears, a red stripe appears down the center of the paper. This stripe is a warning that a new roll of paper must be installed.

(3) Examine the inking ribbon to be sure it is not twisted in the ribbon guide and that the ribbon is being unwound from one spool onto the other spool.

Note. To prevent accidental transmission during reception of a message, loosen the locknut (fig. 13), push the keyboard lock to the rear, and tighten the locknut. To permit later transmission, move the keyboard lock to the forward position.

35. Stopping Procedure

To stop the teletypewriter, use the applicable procedure described below.

a. Standby Condition. To place all interconnected teletypewriters equipped with the motor-stop feature in the standby condition, press the FIGS key and then the STOP key (upper-case H). This action will cause the motors of all teletypewriters to stop. An operator at any of the teletypewriters can start all the motors by pressing and releasing the BREAK key. This feature permits an operator to start all teletypewriters, transmit his message, and stop all teletypewriters.

b. Complete Shut Down. To close a teletypewriter to traffic, move the MOTOR switch (fig. 6) and LIGHT switch (fig. 17) to OFF.

CHAPTER 4
OPERATOR'S MAINTENANCE INSTRUCTIONS

36. Scope of Operator's Maintenance

Following is a list of maintenance duties normally performed by the teletypewriter operator. These procedures do not require any tools or test equipment.

a. Preventive maintenance (par. 37).
b. Replacement of recording paper (par. 31).
c. Replacement of inking ribbon (par. 32).
d. Replacement of fuses and lamp (par. 40).

37. Preventive Maintenance

(fig. 22 and 23)

a. DA Form 11–252. DA Form 11–252 is a maintenance check list to be used by the operator. Items No. 1, 2, and 3 should be performed daily and items 5, 6, and 7 weekly by the operator. Items not applicable to the equipment are lined out in figure 23. References in the ITEM block in figure 23 are to paragraphs which contain additional maintenance information pertinent to the particular item. Instructions for the use of the form appear on the form.

b. Items. The information in the following chart is supplementary to DA Form 11–252. The item numbers in the chart correspond to the ITEM numbers on the form.

Item No.	Maintenance procedure
2	If necessary, use a cloth dampened with Cleaning Compound* then wipe with a clean dry cloth.
6	Check the signal line and power cords for sharp bends or severe twists; examine the insulation for dry rot or breaks.

*Cleaning Compound, Federal stock No. 7930–395–9542.

***Caution:* Cleaning Compound is flammable and its fumes are toxic. Do not use near a flame. Provide adequate ventilation.**

38. Visual Inspection

a. When the equipment fails to perform properly, turn off the power and check all the items listed below. *Do not check any item with the power on.*

(1) Switches and controls, improper settings.
(2) Cable connectors worn, broken, or disconnected.
(3) Ground connection loose, broken, or disconnected.

b. If possible, correct any deficiencies discovered. If the corrections do not restore the equipment to use, or if the correction is beyond the

MAINTENANCE CHECK LIST FOR SIGNAL EQUIPMENT
TELETYPEWRITER

(AR 750-625)

EQUIPMENT NOMENCLATURE

TELETYPEWRITER SET AN/PGC-1

EQUIPMENT SERIAL NUMBER

1278

INSTRUCTIONS

This form may be used for a period of one month by using the correct dates and weeks of the month. It is to be used as a Preventive Maintenance check list for Signal equipment in actual use, or for a check on equipment prior to issue.

1. For detailed Preventive Maintenance instructions see:
   a. The Technical Manual *(in TM 11 series)* for the equipment. *(See DA Pamphlet Number 310-4)*
   b. The Supply Bulletin *(SB 11-100 series)* for the equipment. *(See DA Pamphlet Number 310-4)*
   c. The Department of the Army Lubrication Order. *(See DA Pamphlet Number 310-4)*

2. The following action will be taken by either the Communications Officer/ Chief for 1st echelon, or the Inspector for higher echelon:
   a. Enter Equipment Nomenclature and Serial Number.
   b. Strike out items that do not apply to the equipment.

3. Operator/Inspector will enter in the columns entitled CONDITION, on the proper line, a notation regarding the condition, using symbols specified under LEGEND.

4. After operator completes each daily inspection he will initial over the appropriate dates under "Daily Condition for Month", then return form to his supervisor.

FOLD

TYPE OF INSPECTION

OPER-ATOR	2/3 ECH-ELON	DATE	SIGNATURE
✓		6 FEB '59	John Sharp.

U. S. GOVERNMENT PRINTING OFFICE 1957 O—427033

4

DA FORM 1 MAY 57 11-252

REPLACES DA FORMS 11-252, 1 OCT 55; 11-253, 11-262, AND 11-263; WHICH ARE OBSOLETE.

TM5815-206-12-20

Figure 22. DA Form 11–252, pages 1 and 4.

LEGEND for marking conditions:
Satisfactory, ✓.
Adjustment, Repair or Replacement required, X.
Defect corrected, (X).

DAILY CONDITION FOR MONTH OF FEBRUARY 1959

NO.	DAILY ITEM	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	2D 3D ECHELON
		17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		
1.	CHECK FOR NORMAL OPERATION OF EQUIPMENT. BE ALERT FOR ANY UNUSUAL PERFORMANCE OR CONDITION. PAR. 39	✓	✓	✓	✓													
2.	CLEAN DIRT, OIL AND MOISTURE FROM THE EXPOSED SURFACES OF THE TELETYPEWRITER AND COVER. PAR. 37b	✓	✓	✓	✓													
3.	INSPECT ALL EXTERNAL SWITCHES FOR PROPER MECHANICAL ACTION, FREEDOM OF MOVEMENT AND POSITIVE ACTION.	✓	✓	✓	✓													
4.	~~EMPTY CHAD BOXES ON REPERFORATORS AND CHECK BY OPERATION THAT CHAD BOXES ARE FREE OF OBSTRUCTIONS.~~																	

WEEKLY	CONDITION EACH WEEK 1ST	2D	3D	4TH	5TH	2D 3D ECH
5. CLEAN THE INSIDE AND OUTSIDE OF TRANSIT CASES. INSPECT FOR BROKEN OR MISSING LATCHES, HANDLES AND EQUIPMENT SUPPORTS OR BRACKETS.	✓					
6. INSPECT EXTERNAL CABLES AND CORDS FOR CUTS OR GOUGED JACKETS, FRAYING, BAD BRUISES OR KINKS AND BROKEN PLUGS OR CONNECTORS. PAR. 37b	✓					
7. INSPECT EXTERNAL BINDING POSTS AND TERMINAL BLOCKS FOR CRACKS, BREAKS, DIRT, LOOSE SCREWS, LOOSE CONNECTIONS AND MOUNTINGS.	✓					

ADDITIONAL ITEMS FOR 2D AND 3D ECHELON INSPECTIONS	CONDITION
8. ~~INSPECT FOR, AND TIGHTEN, ANY LOOSE SCREWS, NUTS OR BOLTS ON THE COVER OR TRANSIT CASES. CHECK FOR BROKEN CATCHES, LATCHES, HANDLES, HINGES AND MOUNTINGS.~~	
9. ~~INSPECT COVER WINDOWS FOR CRACKS, BREAKAGE, OR OTHER DAMAGE.~~	
10. ~~INSPECT ALL ELECTRICAL PLUGS AND RECEPTACLES FOR BREAKAGE, FIRM SEATING, PROPER CONTACT, CORROSION AND GREASE OR OIL DEPOSITS. CLEAN IF REQUIRED.~~	
11. ~~INSPECT CABLES, CORDS AND WIRING FOR CUT OR GOUGED JACKETING, KINKS, BAD BRUISES OR FRAYING.~~	
12. ~~INSPECT BINDING POSTS AND TERMINAL BLOCKS FOR CRACKS, BREAKS, DIRT AND LOOSE CONNECTIONS.~~	
13. ~~INSPECT FOR LOOSE MOUNTING SCREWS AND NUTS ON PARTS OR BRACKETS.~~	
14. ~~INSPECT ALL SWITCHES FOR BINDING, FREEDOM OF MOVEMENT AND POSITIVE ACTION.~~	
15. ~~INSPECT MOTOR AND GOVERNOR FOR WORN BRUSHES AND CONTACTS. CLEAN IF REQUIRED.~~	

ADDITIONAL ITEMS FOR 2D AND 3D ECHELON INSPECTIONS	CONDITION
16. ~~CLEAN THE TYPE PALLETS.~~	
17. ~~CLEAN THE KEYTOPS AND CHECK FOR BROKEN, MISSING, LOOSE, OR ILLEGIBLE KEYTOPS.~~	
18. ~~CLEAN INK FEED TUBES AND INK WELLS; REPLACE INKING FELT OR TYPING RIBBON IF REQUIRED.~~	
19. ~~INSPECT GENERAL CONDITION OF LUBRICATION AND LUBRICATE AS REQUIRED IN ACCORDANCE WITH APPLICABLE LUBRICATION INSTRUCTIONS.~~	
20. ~~CLEAN EXCESS OIL, GREASE AND DIRT FROM MECHANICAL ASSEMBLAGES, GEARS, SHAFTS, FRAMES, ETC.~~	
21. ~~PERFORM ANY ADJUSTMENT REQUIRED AS A RESULT OF CLEANING, LUBRICATION OR NORMAL WEAR.~~	
22. ~~INSPECT FOR FREE MOVEMENT OF ALL MOVING PARTS. BENT, BROKEN, DISTORTED OR WORN SHAFTS, GEARS, CAMS, SPRINGS, CLUTCHES, BUSHINGS AND BEARINGS.~~	
23. ~~OPERATE EACH KEY AND CHECK THE FUNCTIONAL RESPONSE.~~	
24. ~~CHECK THAT THE PRINTING ON PAGE PRINTERS IS IN ALIGNMENT HORIZONTALLY AND THAT THE CHARACTERS ARE EVENLY SPACED AND FULLY PRINTED. CHECK THAT THE CHARACTERS ARE FULLY PRINTED ON TYPING REPERFORATORS.~~	
25. ~~CHECK THE TAPE OF TYPING AND NON-TYPING REPERFORATORS AND PERFORATORS FOR CLEAN PUNCHING OF CODE AND FEED HOLES.~~	

IF DEFICIENCIES NOTED ARE NOT CORRECTED DURING THE INSPECTION, INDICATE ACTION TAKEN FOR CORRECTION. *(Continue on page 4, if more space is needed)*

2 3

TM5815-206-12-21

Figure 23. DA Form 11–252, pages 2 and 3.

scope of operator's maintenance, higher-level maintenance is required.

39. Equipment Performance Checklist

Check the operation of the teletypewriter as instructed in the following checklist. Perform the checks in the sequence listed. If the corrective measures do not remove the trouble, higher level maintenance is required.

Item No.	Item	Action	Normal indication	Corrective measures
1	D.C. MILLIAMPERES meter (fig. 17).	If current for signal circuit is to be furnished locally, turn on local dc power source. No action if signal circuit current is furnished by distant station.	Meter indicates 20 ma if LINE switch (fig. 6) is in VOICE FREQ LINE position. Meter indicates 60 ma if switch is in DC LINE position. *Note.* Do not change position of switch.	If meter indicates zero: Check for loose connection to dc power source (if current for signal circuit is supplied locally). Tighten loose connection. Check for loose signal line connection to line terminal board (fig. 14). Tighten loose line connection. Check seating of cable plugs in associated equipment jacks if Cable Assemblies CX–1200/U and CX–1201/U (fig. 4) are used. Press plugs into jacks firmly. Check LINE fuse (fig. 17). Replace fuse if blown (par. 40). If meter indicates presence of current but not of proper value, adjust LINE INCREASE knob (fig. 17) to obtain proper current value (see normal indication for item 1).
2	BREAK switch (fig. 6).	Press momentarily	Pointer of D.C. MILLIAMPERES meter moves to zero and back to proper current value (see item 1 above) if teletypewriter is installed for half-duplex operation (fig. 15). No change in pointer position for receive-only and full-duplex operations (fig. 16).	Higher level maintenance required.
3	LIGHT switch (fig. 17).	Move to ON	Copy lamp in dust cover should light.	Check to be sure motor power cord is fully seated in ac power receptacle. Press dust cover downward to insure proper seating of cover on base. Check lamp; replace if defective.
4	MOTOR switch (fig. 6).	Move to ON	Motor should start	Press and release BREAK switch (fig. 6). Check MOTOR fuse (fig. 17). Replace if blown (par. 40).
5	Governor target (fig. 6).	Check motor speed with tuning fork (par. 16).	Spots on target should appear stationary.	Adjust motor speed (par. 16).

Item No.	Item	Action	Normal indication	Corrective measures
6	Keyboard keys	Transmit test message	Test message correctly printed by page printer.	Have distant station transmit test message. It this test message is printed correctly by page printer, higher level maintenance of keyboard transmitter is required. If page printer prints incorrect copy regardless of source of signals, check adjustment of ARMATURE and RANGE dials (par. 25).
7	FIGS key (fig. 13)	Press and release	Platen (fig. 6) moves to upper (figures-shift) position.	Higher level maintenance required.
8	LTRS key (fig. 13)	Press and release	Platen moves to lower (letters-shift) position.	Higher level maintenance required.
9	LINE FEED key	Move single-double line-feed lever (fig. 18) to lower position and press LINE FEED key.	Platen turns slightly to move printed line upward 1-line space.	Higher level maintenance required.
		Move single-double line-feed lever to upper position and press LINE FEED key.	Platen moves printed line upward 2-line spaces.	Higher level maintenance required.
10	Space bar (fig. 13)	Press and immediately release.	Type-bar carriage (fig. 6) moves 1 space to the right.	Higher level maintenance required.
		Press and hold down	Type-bar carriage moves to extreme right margin. Margin bell rings 6 spaces before carriage reaches right margin.	Higher level maintenance required.
11	CAR RET key	Press and release	Type-bar carriage moves to left margin.	Higher level maintenance required.
12	BELL (upper-case S) key.	Press FIGS key and then BELL key.	Signal bell rings (sound is much louder than margin bell (item 10 above)).	Higher level maintenance required.
13	STOP (upper-case H) key.	Press FIGS key and STOP key.	Motor stops	Higher level maintenance required.
		With motor stopped, press BREAK switch (fig. 14).	Motor starts	Higher level maintenance required.
14	Keyboard lock (fig. 13).	Loosen locknut, move keyboard lock to rear position, tighten locknut, press and release any key of keyboard.	Teletypewriter does not transmit (no effect on page printer).	Higher level maintenance required.
		Move keyboard lock to forward position and press key of keyboard.	Page printer prints correct character.	Higher level maintenance required.
15	Inking ribbon	Transmit test message	Ribbon lifted upward by ribbon guide (fig. 21) for printing of each character and moved downward after printing.	Check for binding of ribbon in ribbon guide.
			Ribbon slowly unwound from 1 ribbon spool on to other spool.	Check for proper attachment of ribbon to spool (par. 32*d*(3)).

40. Replacement of Lamp and Fuses

a. Lamp Replacement.

(1) Remove the dust cover (par. 31*a*).

(2) To remove the lamp, press the lamp into its socket in the dust cover, turn the lamp slightly, and pull it from the socket.

(3) Insert the new lamp into the socket, press and turn the lamp slightly to secure it firmly in the socket.

(4) Replace the dust cover. Be sure to reconnect the dust cover ground leads (fig. 5).

b. Fuse Replacement.

(1) Lift the front door (fig. 5).

(2) Press the fuse cap (fig. 17) inward, turn the cap slightly to the right, and pull the cap and fuse from the fuse holder.

(3) Insert the new fuse in the fuse holder and replace the fuse cap.

Caution: **Insert only 1/8-ampere replacement fuses in the LINE FUSE holder. Insert only 1.6-ampere fuses in the MOTOR FUSE holder.**

CHAPTER 5
AUXILIARY EQUIPMENT

41. General

a. Auxiliary equipment normally is not required for direct communication between tactical military teletypewriters separated by relatively short distances. As the distance between teletypewriters is increased, auxiliary equipment is required to assure reliable interoperation of the teletypewriters.

b. Convenient switching of tactical teletypewriter traffic also requires auxiliary equipment. This equipment converts the dc signals transmitted from the sending teletypewriter into ac signals that can be switched through telephone and radio equipment. Similar auxiliary equipment is required at the distant station to convert the ac signals back into dc signals for operation of the receiving teletypewriter.

c. Telegraph Terminal TH–5/TG normally is used with tactical military teletypewriters to meet the requirements in *a* and *b* above.

42. Purpose of Telegraph Terminal TH–5/TG

Telegraph Terminal TH–5/TG, when used with the AN/PGC–1, converts the dc signals which it receives from the keyboard transmitter of the sending teletypewriter into voice-frequency signals. The voice-frequency signals are then transmitted either directly to another TH–5/TG at the receiving station, through telephone switching equipment to the distant TH–5/TG, or through other carrier or radio equipment to the TH–5/TG at the distant station (fig. 2). The TH–5/TG at the distant station converts the received voice-frequency signals back to dc signals and transmits the dc signals to the page printer of the receiving teletypewriter. The TH–5/TG also permits simultaneous teletypewriter and telephone transmission over a signal circuit when the TH–5/TG is used in conjunction with other auxiliary equipment. Refer to TM 11–2239 for detailed information on the TH–5/TG.

43. Use of TH–5/TG with AN/PGC–1

a. Installation.

(1) Prepare the TH–5/TG for operation as follows:

(*a*) Place the TH–5/TG on a firm support within 3 feet of the teletypewriter.

(*b*) Connect the signal lines from the distant station to the binding posts on the front panel of the TH–5/TG. Refer to TM 11–2239 for installation options of the TH–5/TG. Set the 4W–2W–TEL switch on the front panel of the TH–5/TG to the proper position for the installation option used.

(*c*) Connect the power cord of the TH–5/TG to a source of 115-volt, 50- to 60-cps ac.

(2) Prepare the teletypewriter for operation (pars. 12–16).

(3) Connect the teletypewriter to the TH–5/TG (pars. 18 and 20).

(4) Turn the LINE INCREASE knob (fig. 17) on the teletypewriter until the D.C. MILLIAMPERES meter indicates 20 ma.

Note. The current level in the teletypewriter send circuit is determined by the circuitry of the TH–5/TG and is not adjustable.

b. Operation. Operate the teletypewriter as described in paragraphs 30 through 35, except as follows:

(1) Before starting transmission from the teletypewriter, be sure the lamp on the front panel of the TH–5/TG is lighted. This lamp is a busy signal that goes out when any teletypewriter in the circuit begins transmitting.

(2) When the teletypewriter is connected through a TH–5/TG to a telephone switchboard, signal the switchboard operator as follows:

(*a*) Press and release the RING switch on the TH–5/TG to signal the operator of a local-battery switchboard.

(*b*) Operate the 4W–2W–TEL switch to the 2W position (2-wire operation) or to the 4W position (4-wire operation) to signal the operator of a common-battery switchboard. At the completion of transmission, operate the switch to the TEL position.

CHAPTER 6
SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

44. Disassembly of Equipment

a. Disconnect the motor power cord from the ac power source.

b. Disconnect the plug of Power Cable Assembly CX–1202/U (fig. 4), if used, from the dc power source.

c. If Cable Assemblies CX–1200/U and CX–1201/U (fig. 4) were used, pull their plugs from their associated jacks.

d. Remove the dust cover (par. 31*a*).

e. Disconnect all cable assemblies or signal lines from the terminals of the line terminal board (fig. 6). Disconnect the protective ground from the ground terminal.

f. Remove the roll of recording paper from the rear of the teletypewriter.

g. Wind the motor power cord into a coil and tie the coil under the paper chute.

h. Set the following locking devices in the locking position (par. 14):

(1) Platen lock.
(2) Carriage lock.
(3) Keyboard lock.
(4) Blocking plate.

i. Fill the type basket portion of the type-bar carriage (fig. 6) with cloth or other suitable wadding and tie the wadding securely to the type-bar carriage to prevent movement of the type bars during shipment.

j. Replace the dust cover and immersion proof cover.

45. Repackaging for Shipment or Limited Storage

a. Insert the teletypewriter into the case (fig. 11).

b. Insert the cable assemblies and spare parts into Bag CW–356/U, secure the straps and the bag in place on top of the teletypewriter. Place the technical manuals in a bag of moistureproof material, if available, and wedge the manuals between the teletypewriter and the case.

c. Insert the wooden blocks (fig. 10) to wedge the teletypewriter securely in the case.

d. Strap the recording paper rolls to the lid of the case.

e. Close the lid and latch the lid securely to the case.

Section II. DEMOLITION OF MATERIEL TO PREVENT ENEMY USE

46. Authority for Demolition

Demolition of the equipment will be accomplished only upon order of the commander. The destruction procedure in paragraph 47 will be used to prevent future use of the equipment.

47. Methods of Destruction

Use any or all of the following methods to destroy the equipment:

a. Smash. Smash the controls, magnets, switches, capacitors, castings, shafts, gears, and bearings; use sledges, axes, handaxes, pickaxes, hammers or crowbars.

b. Cut. Cut all cables and base wiring; use axes, cutting pliers, bayonets, or machetes.

c. Burn. Burn all cords, wiring diagrams, technical manuals, and coils; use gasoline, kerosene, oil, flame throwers, or incendiary grenades.

d. Bend. Bend covers and bases.

e. Explode. If explosives are necessary, use fire arms, granades, or TNT.

f. Dispose. Bury or scatter the destroyed parts in slit trenches, foxholes, or throw them into streams.

APPENDIX I
REFERENCES

The references listed below are applicable to the operation of Teletypewriter Set AN/PGC–1 and Teletypewriters TT–4(*)/TG:

TM 11–943 Engine Generators PU–181/PGC–1 and PU–181A/PGC–1 and Power Unit PE–214–D.

TM 11–2239 Telegraph-Telephone Terminal AN/TCC–14.

APPENDIX II
MAINTENANCE ALLOCATION CHART

1. General

a. Scope. The maintenance allocation portion of this manual assigns maintenance functions and repair operations to be performed by the lowest appropriate echelon. It also specifies the tool and test equipments authorized at each echelon to perform the assigned maintenance functions.

b. Maintenance Allocation Chart Columns.

(1) *Part or component.* Column 1 shows only the nomenclature or standard item name. Components and parts comprising the major end item are listed alphabetically. Assemblies, subassemblies, and related parts are arranged as groups. The component parts of each group are listed alphabetically immediately below the group listing. Mounting hardware, such as screws, bolts, nuts, washers, brackets, and clamps, is not included in the list.

(2) *Maintenance function.* Column 2 indicates the various maintenance functions that will be performed for each part or assembly listed in column 1. These maintenance functions are defined as follows:

(*a*) *Service.* To clean; to preserve; and to replenish fuel and lubricants.

(*b*) *Adjust.* To regulate periodically to prevent malfunction.

(*c*) *Inspect.* To verify serviceability and to detect incipient electrical or mechanical failure by scrutiny.

(*d*) *Test.* To verify serviceability and to detect incipient electrical or mechanical failure by use of special equipment, such as gages, meters, etc.

(*e*) *Replace.* To substitute serviceable assemblies, subassemblies, and parts for unserviceable components.

(*f*) *Repair.* To restore to a serviceable condition by replacing unserviceable parts or by any other action required, utilizing tools, equipment, and skills available, to include grinding, riveting, straightening, adjusting, etc.

(*g*) *Rebuild.* To restore to a condition comparable to new by disassembling the item to determine the condition of each of its component parts and reassembling it using serviceable, rebuilt, or new assemblies, subassemblies, and parts.

(3) *1st, 2d, 3d, 4th, 5th echelon.* The symbol X in column 3, 4, 5, 6, or 7 indicates that that echelon and higher echelons are responsible for the maintenance function indicated. Repair parts may not, necessarily, be stocked at the echelon indicated; refer to the applicable repair parts and special tools list.

(4) *Tools Required.* The numbers in column 8 indicate tool and test equipments required to perform the related maintenance function. These numbers are identified in Allocation of Tools for Maintenance Functions.

(5) *Remarks.* Column 9 contains any notations necessary to clarify the data cited in the preceding columns.

2. Maintenance by Using Organizations

When this equipment is used by signal service organizations organic to the theatre headquarters or communication zone to provide theatre communications, those maintenance functions allocated up to and including fourth echelon are authorized to the organization operating this equipment.

3. Comments or Suggestions

Any comments concerning omissions and discrepancies in this Maintenance Allocation Chart will be prepared on DA Form 2028 and forwarded direct to Commanding Officer, U.S. Army Signal Equipment Support Agency, Fort Monmouth, N.J., ATTN: SIGFM/ES–M.

MAINTENANCE ALLOCATION CHART

(1) PART OR COMPONENT	(2) MAINTENANCE FUNCTION	(3) 1ST ECH.	(4) 2ND ECH.	(5) 3RD ECH.	(6) 4TH ECH.	(7) 5TH ECH.	(8) TOOLS REQUIRED	(9) REMARKS
TELETYPEWRITER SET AN/PGC-1	repair			X			6,7	
	rebuild					X	6,7	
BAG CW-356/PGC-1	replace	X						
CABLES, POWER ELECTRICAL	replace			X			6	
CONNECTORS, PLUG	replace			X			6	
PLUGS, TELEPHONE	replace			X			6	
TELETYPEWRITER TT-4A/TG, TT-4B/TG	repair			X			6,7	
	rebuild					X	6,7	
	service	X						Except lubrication
	service			X			6	Lubrication
	adjust	X						Range, armature, linecurrent and motor speed adjustments
	adjust			X			1,2,3,6,7	All adjustments
	inspect	X						
	test	X						Operational test
	test			X			1,2,3,6,7	Performs resistance, voltage and current measurements to determine condition of circuits and tests network line-up, conducts distortion test
	test				X		1,2,4,5,6,7	Conducts all tests to insure equipment returned to user meets minimum mechanical, visual, electrical and operational requirements
GROUP I: COVERS AND AUXILLIARY GROUP								
ARM	replace			X				
COVERS	replace	X					6,7	
	repair					X	6,7	
FASTENERS, LATCH	replace			X				
MOUNTS, VIBRATION	replace			X				
MOUNTING	replace			X			6,7	
	repair					X	6,7	
PAPER, RECORDING	replace	X						
RIBBON, TELETYPEWRITER	replace	X						
SHAFT, PAPER ROLL	replace	X						
SPOOL, PRINTING, RIBBON	replace	X						

(1) PART OR COMPONENT	(2) MAINTENANCE FUNCTION	(3) 1ST ECH.	(4) 2ND ECH.	(5) 3RD ECH.	(6) 4TH ECH.	(7) 5TH ECH.	(8) TOOLS REQUIRED	(9) REMARKS
AN/PGC-1 (continued)								
SPRING	replace			X				
WINDOW	replace			X				
GROUP 2: MOTOR AND GOVERNOR SUB-ASSEMBLY								
GOVERNOR	replace			X			6,7	
	repair			X			6,7	
BRUSHES	replace			X				
CONTACT, ELECTRICAL	replace			X				
GEAR	replace			X				
INSULATOR, BUSHING	replace			X				
LEVER	replace			X				
PIN, COTTER	replace			X				
PIN, GROOVED	replace			X				
SCREW, ADJUSTMENT	replace			X				
SPRINGS	replace			X				
MOTOR, UNIVERSAL	replace			X			6,7	
	repair				X		6,7	
	rebuild					X	6,7	
ARMATURE, MOTOR	replace				X		6,7	
	repair				X		6,7	
BRUSHES, ELECTRICAL	replace			X				
CAPS, ELECTRICAL	replace			X				
CAPACITORS	replace			X				
DISK, RETAINER	replace			X				
DISK STROBOSCOPE	replace			X				
FELT, MECHANICAL, PREFORMED	replace			X				
SEAL, DUST	replace			X				
WINDING, MOTOR FIELD	replace				X		6,7	
	repair					X	6,7	
GROUP 3: KEYBOARD AND TRANSMITTER								
BARS, SELECTOR TELETYPEWRITER	replace			X				
BAR, SPACE, TELETYPEWRITER	replace			X				
BEARINGS, BALL	replace			X				
BEARINGS, PIVOT	replace			X				
BEARING SET	replace			X				
CAMSHAFTS	replace			X				
COLLAR, SPACING	replace			X				
CONTACT ASSEMBLY, ELECTRICAL	replace			X				

(1) PART OR COMPONENT	(2) MAINTENANCE FUNCTION	(3) 1ST ECH.	(4) 2ND ECH.	(5) 3RD ECH.	(6) 4TH ECH.	(7) 5TH ECH.	(8) TOOLS REQUIRED	(9) REMARKS
AN/PGC-1 (continued)								
COVER, ELECTRICAL SWITCH	replace			X				
FORK, CLUTCH	replace			X				
GUIDES, LEVER	replace			X				
KEYTOPS, TELETYPEWRITER	replace			X				
LATCHES, LEVER	replace			X				
LEVERS	replace			X				
LEVER SETS	replace			X				
MOUNTING	replace			X				
PLATE, FRICTION	replace			X				
SCREW, ADJUSTMENT	replace			X				
SPRINGS	replace			X				
STUDS	replace			X				
GROUP 4: PLATEN SUB-ASSEMBLY								
BUMPER, RUBBER	replace			X				
COLLAR, SHAFT	replace			X				
DETENT	replace			X				
KNOB	replace			X				
LEVERS	replace			X				
PAWL	replace			X				
PLATEN, TELETYPEWRITER	replace			X				
SPRINGS	replace			X				
WHEEL, DETENT	replace			X				
GROUP 5: CARRIAGE SUB-ASSEMBLY								
ARM	replace			X				
BARS, CONNECTING, TELETYPEWRITER	replace			X				
BARS, T, TELETYPEWRITER	replace			X				
BEARINGS, BALL	replace			X				
BEARING, PIVOT	replace			X				
BUMPER, TYPE BAR	replace			X				
CLAW	replace			X				
CLEVIS, ROD END	replace			X				
COLLARS, SHAFT	replace			X				
COLLARS, SPACING	replace			X				
CRANK, BALL	replace			X				
CUSHION	replace			X				
DRIVE, RIBBON	replace			X				
FOLLOWERS, CAM	replace			X				

(1) PART OR COMPONENT	(2) MAINTENANCE FUNCTION	(3) 1ST ECH.	(4) 2ND ECH.	(5) 3RD ECH.	(6) 4TH ECH.	(7) 5TH ECH.	(8) TOOLS REQUIRED	(9) REMARKS
AN/PGC-1 (continued)								
GEAR, BEVEL	replace			X				
GEAR, HELICAL	replace			X				
GEAR, RACK	replace			X				
GUIDE, RIBBON	replace			X				
INKING PAD, TELETYPEWRITER RIBBONS	replace		X					
INKWELL ASSEMBLY	replace			X				
KEY, MACHING	replace			X				
LEVERS, SENSING	replace			X				
LEVER ASSEMBLY	replace			X				
PIN, HINGE	replace			X				
PIN, STRAIGHT, HEADED	replace			X				
PLATE, DETENT	replace			X				
PLATE, TELETYPEWRITER RETRACTOR	replace			X				
RAIL, GUIDE	replace			X				
SHAFTS	replace			X				
SHIMS	replace			X				
SPRINGS	replace			X				
TURNBUCKLE	replace			X				
GROUP 6: FUNCTION FRAME								
ARM	replace			X				
ARMATURE, RELAY	replace			X				
BAR, LOCKING, TELETYPEWRITER	replace			X				
BAR, PUNCH	replace			X				
BEARINGS, BALL, ANNULAR	replace			X				
BEARING, SLEEVE	replace			X				
CAMS	replace			X				
CLAPPER	replace			X				
CLAW	replace			X				
CLUTCH, FRICTION	replace			X				
COLLAR, SHAFT	replace			X				
COLLAR, SPACING	replace			X				
COUPLING, SHAFT, FLEXIBLE	replace			X				
DRUM, CLUTCH	replace			X				
FOLLOWERS, CAM	replace			X				
GASKET	replace			X				
GATE, APERTURE	replace			X				
GEARS	replace			X				

(1) PART OR COMPONENT	(2) MAINTENANCE FUNCTION	(3) 1ST ECH.	(4) 2ND ECH.	(5) 3RD ECH.	(6) 4TH ECH.	(7) 5TH ECH.	(8) TOOLS REQUIRED	(9) REMARKS
AN/PGC-1 (continued)								
LEVERS	replace			X				
LINK, SPACE BAR	replace			X				
PIVOT	replace			X				
PLATE, ADJUSTING	replace			X				
PLATE, FRICTION	replace			X				
ROLLER, CAM	replace			X				
SHAFTS	replace			X				
SPRINGS	replace			X				
GROUP 7: SELECTOR								
ARMS	replace			X				
ARMATURE, INDUCTION COIL	replace			X				
BARS, SELECTOR, TELETYPEWRITER	replace			X				
BEARING SET	replace			X				
BEARINGS, PIVOT	replace			X				
CAM	replace			X				
CAMSHAFT	replace			X				
CLAMP, ELECTRICAL	replace			X				
CLUTCH, FRICTION	replace			X				
COLLARS, LOCKING	replace			X				
COLLARS, SHAFT	replace			X				
COLLARS, SPACING	replace			X				
DIALS, CONTROL	replace			X				
DISK, CLUTCH	replace			X				
DISK, DRIVING	replace			X				
FORK, CLUTCH	replace			X				
GEARS	replace			X				
LATCH, LEVER	replace			X				
LEVERS	replace			X				
LEVER ASSEMBLIES	replace			X				
LEVER SET	replace			X				
PIN, GROOVED	replace			X				
PLATE, FRICTION	replace			X				
PLATE, GUIDE	replace			X				
PLATE, STOP	replace			X				
POST, ANCHOR	replace			X				
RING, CODE, TELETYPEWRITER	replace			X				
SHAFTS	replace			X				

(1) PART OR COMPONENT	(2) MAINTENANCE FUNCTION	(3) 1ST ECH.	(4) 2ND ECH	(5) 3RD ECH	(6) 4TH ECH.	(7) 5TH ECH.	(8) TOOLS REQUIRED	(9) REMARKS
AN/PGC-1 (continued)								
SPRINGS	replace			X				
STOP, LEVER	replace			X				
GROUP 8: FUNCTION								
BALLS, POSITIONING	replace			X				
BEARINGS, BALL, ANNULAR	replace			X				
CAM	replace			X				
CLAPPER	replace			X				
CLUTCH	replace			X				
CLUTCH, FRICTION	replace			X				
CLUTCH, POSITIVE	replace			X				
CLUTCH SUB-ASSEMBLY	replace			X				
COLLARS	replace			X				
DISK, CLUTCH	replace			X				
DRUM CLUTCH	replace			X				
GEARS	replace			X				
KNOB	replace			X				
LATCH, LEVER	replace			X				
LEVERS	replace			X				
LINK, CONNECTING	replace			X				
LINK, PLUNGER	replace			X				
PAWL	replace			X				
PAWL ASSEMBLY	replace			X				
PLATE, FRICTION	replace			X				
SHAFTS	replace			X				
SPRINGS	replace			X				

(1) PART OR COMPONENT	(2) MAINTENANCE FUNCTION	(3) 1ST ECH	(4) 2ND ECH	(5) 3RD ECH	(6) 4TH ECH	(7) 5TH ECH	(8) TOOLS REQUIRED	(9) REMARKS
AN/PGC-1 (continued)								
STUD	replace			X				
WASHER, SPRING	replace			X				
WASHER, THRUST	replace			X				
WHEEL, RATCHET	replace			X				
GROUP 9: ELECTRICAL GROUP								
AMMETER	replace			X				
CABLE	replace			X				
CAPS, ELECTRICAL	replace	X						
CAPACITORS	replace			X				
COILS, RADIO, FREQUENCY	replace			X				
CONNECTOR ASSEMBLY, ELECTRICAL	replace			X				
CONNECTOR, PLUG, ELECTRICAL	replace			X				
CONNECTORS	replace			X				
CONTACT ASSEMBLY	replace			X				
CONTACTS, ELECTRICAL	replace			X				
FILTER, RADIO INTERFERENCE	replace			X				
FUSE, CARTRIDGE	replace	X						
FUSEHOLDER	replace			X				
KNOB	replace			X				
LAMP, INCANDESCENT	replace	X						
LAMPHOLDER	replace			X				
MAGNET	replace			X				
POSTS, BINDING	replace			X				
RESISTORS	replace			X				
SWITCHES	replace			X				
TERMINAL BOARD	replace			X				

4. Allocation of Tools for Maintenance Functions Columns

a. Tools required for maintenance functions. Column 1 lists the tool and test equipments required to perform the maintenance functions.

b. 1st, 2d, 3d, 4th, and 5th echelon. The symbol "†" in column 4, 5, or 6 indicates that the tool or test equipment is allocated to that echelon.

c. Tool code. The numbers in column 7 are code numbers that stand for the associated tool or test equipment and are used in the Maintenance Allocation Chart to refer to the indicated item.

d. Remarks. Columns 8, not used.

ALLOCATION OF TOOLS FOR MAINTENANCE FUNCTIONS

(1) TOOLS REQUIRED FOR MAINTENANCE FUNCTIONS	(2) 1ST ECH.	(3) 2ND ECH.	(4) 3RD ECH.	(5) 4TH ECH.	(6) 5TH ECH.	(7) TOOL CODE	(8) REMARKS
AN/PGC-1 (continued)							
MULTIMETER AN/URM-105			†	†	†	1	
SHUNT INSTRUMENT MULTI-RANGE MX1471/U			†	†	†	2	
TEST SET TS-2/TG			†			3	
DISTORTION TEST SET TS-383(*)/GS				†	†	4	
OHMMETER ZM-21/U				†	†	5	
TOOL EQUIPMENT TE-50B			†	†	†	6	
TOOL EQUIPMENT TE-111			†	†	†	7	

[AG 413.48 (27 Mar 59)]

By Order of *Wilber M. Brucker*, Secretary of the Army:

MAXWELL D. TAYLOR,
General, United States Army,
Chief of Staff.

Official:

R. V. LEE,
Major General, United States Army,
The Adjutant General.

Distribution:

Active Army:

ASA (2)
CNGB (1)
Tech Stf, DA (1) except CSigO (30)
Tech Stf Bd (1)
USA Arty Bd (1)
USA Armor Bd (1)
USA Inf Bd (1)
USA AD Bd (1)
USA Abn & Elct Bd (1)
USA Avn Bd (1)
USA Armor Bd Test Sec (1)
USA AD Bd Test Sec (1)
USA Arctic Test Bd (1)
USCONARC (5)
US ARADCOM (2)
US ARADCOM Rgn (2)
OS Maj Comd (5)
OS Base Comd (5)
Log Comd (5)
MDW (1)
Armies (5) except First US Army (7)
Corps (2)
Div (2)
USATC (2)
USMA (5)
Svc Colleges (5)
Br Svc Sch (5) except
USACS (25)
USASESCS (50)
Gen Dep (2) except Atlanta Gen Dep (none)
Sig Sec, Gen Dep (10)
Sig Dep (17)
USAAMC (400)
Army Pictorial Cen (2)
Engr Maint Cen (1)
USA Ord Msl Comd (3)
Fld Comd, AFSWP (5)
TASSA (15)
Mid-Western Rgn Ofc (TASSA) (1)
USA Sig Pub Agcy (8)
USA Sig Engr Agcy (1)
USA Comm Agcy (2)
USA Sig Eqp Spt Agcy (2)
USA Sig Msl Spt Agcy (13)
WRAMC (1)
AFIP (1)
AMS (1)
Ports of Emb (OS) (2)
Trans Terminal Comd (1)
Army Terminals (1)
OS Sup Agcy (2)
Yuma Test Sta (2)
USA Elct PG (1)
Sig Lab (5)
Sig Fld Maint Shops (3)
Mil Dist (1)
USA Corps (Res) (1)
Sector Comd, USA Corps (Res) (1)
JBUSMC (2)
Units organized under following TOE's:
1-207 (2)
3-32 (2)
5-15 (2)
5-16 (2)
5-35 (2)
5-36 (2)
5-192 (2)
5-262 (2)
5-266 (2)
5-267 (2)
5-279 (2)
5-301 (2)
5-312 (2)
5-315 (2)
5-316 (2)
5-352 (2)
5-372 (2)
5-376 (2)
5-412 (2)
5-500 (AA-AD) (2)
6-200 (2)
6-201 (2)
6-226 (2)
6-236 (2)
6-416 (2)
6-435 (2)
6-501 (2)
6-535 (2)
6-536 (2)
7-11 (2)
7-12 (2)
7-31 (2)
7-32 (2)
7-52 (2)
8-22 (2)
8-187 (2)
8-581 (2)
8-590 (2)
8-667 (2)
9-12 (2)
9-17 (2)
9-22 (2)
9-47 (2)
9-57 (2)
9-65 (2)
9-66 (2)
9-67 (2)
9-76 (2)
9-86 (2)
9-87 (2)
9-377 (2)
10-17 (2)
10-22 (2)
10-77 (2)
10-377 (2)
11-5 (2)
11-7 (2)
11-15 (2)
11-16 (2)
11-17 (2)
11-18 (2)
11-22 (2)
11-32 (2)
11-37 (2)
11-45 (2)
11-54 (2)
11-55 (2)
11-57 (2)
11-85 (2)
11-87 (2)
11-95 (2)
11-96 (2)
11-97 (2)
11-98 (2)
11-117 (2)
11-500 (AA-AE) (2)
11-537 (2)
11-555 (2)
11-557 (2)
11-558 (2)
11-587 (2)
11-592 (2)
11-597 (2)
17-2 (2)
17-22 (2)
19-252 (2)
19-256 (2)
20-300 (2)
30-15 (2)
30-16 (2)
30-19 (2)
30-21 (2)
30-22 (2)
30-79 (2)
32-51 (2)
32-55 (2)
32-56 (2)
32-57 (2)
32-500 (2)
33-56 (2)
39-51 (2)
39-61 (2)
39-71 (2)
44-12 (2)
44-70 (2)
44-101 (2)
44-112 (2)
44-201 (2)
51-15 (2)
51-16 (2)
55-11 (2)
55-12 (2)
55-16 (2)
55-56 (2)
55-116 (2)
55-202 (2)
55-225 (2)
55-227 (2)
55-260 (2)
55-445 (2)
55-500 (AA-AE) (2)

NG: State AG (3); units—same as Active Army except allowance is one copy to each unit.
USAR: None.
For explanation of abbreviations used, see AR 320-50.

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